FLIGHT
and
AIRCRAFT ENGINEER

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The Outlook

Efficient Simplicity

"TOO much work has been put into this (the piston) engine for it to be lightly discarded, and perhaps one of the main advantages of the new jet propulsion and turbine-airscrew power units, namely, their relative ease of development, may allow a certain proportion of our resources to be concentrated on our first pet."

Thus a contributor to this issue. Many will share that view, and they will be interested in our contributor's suggestions as to how we might still further improve the piston engine in the limited powers which are coming to be accepted as its remaining field of usefulness.

Put very briefly, the suggestion is that we should not waste time on experimenting with new shapes, but that we should take as a starting point those shapes which have thoroughly proved themselves under the stress of war, and that, since some 1,500 h.p. is the maximum thought desirable for the piston engine, we should "halve" the existing engines and by refinements bring the weight/power ratio down to 0.7 lb per horse-power, and the thermal efficiency up to something like twice that of the turbine-airscrew combination. The writer outlines directions in which improvements in efficiency may be sought, and the "halved" engines should certainly be much less complicated.

The suggestion is an interesting one, and there is precedent for it in our past history. In about 1924, the Aircraft Disposal Company got Major Halford to redesign the old Renault air-cooled vee engine into the Airdisco, which developed 120 h.p. as compared with the 80 h.p. of the Renault. Both, it is true, were vee types, but the "halving" came later when, at the suggestion of Capt. (now Sir Geoffrey) de Havilland, Major Halford produced the first Cirrus engine, of 60 h.p., from four of the eight cylinders of the Airdisco.

The point of these reminiscences is that the first Cirrus engine was produced in nine weeks, from starting the design to the first test run on the bench. It is not, of course, suggested that "half" a Merlin or Hercules could be produced in anything like such a short time, but the general idea is the same, and if it worked well in 1924-25, it might be worth trying in 1946-47.

Licensed Indifference

AMONG the many grumbles—mostly justified—of the present-day private aircraft owner and touring club pilot is the treatment usually received at licensed airfields. Before the war, landing fees for small aircraft seldom exceeded five shillings, and for this fee the pilot received at least some service, often the facilities of a restaurant and, if he desired, a prop-swing before take-off. To-day it is unusual to receive more than a wave in the direction of the parking area. It is almost impossible to get service or food, or even a swing, and frequently the visitor is completely ignored except for the collection of an inflated landing fee.

Fortunately, at several of the airfields there are now active flying clubs, and at them visiting pilots may depend upon the generosity of members for a welcome and for help within their capacity. But there is a risk the airfield authorities, seeing the attitude of the clubs, may grow to expect them to look after visitors and so further reduce the already meagre services of their own inadequate and often ill-qualified staffs.

A further pre-war service which has been allowed to lapse is the check kept on cross-channel flights. To-day, a private owner who, while flying from Lympne to Calais, was unfortunate enough to land in "the drink" would not be missed or reported overdue for a day or more. It is almost certain that French authorities would again be pleased to co-operate in sharing the organization of a cross-channel two-way check of aircraft as they did in 1939 and before. The old system of circling at low altitude for one's number to be taken prior to and after a channel crossing, and the prompt overdue

action arranged on both coasts, was quite satisfactory. It is certainly high time that some similar scheme was re-instituted.

At present the number of private owners and club pilots who are able to indulge in air touring is very small, but gradually the number will grow, and in addition there are the concerns which use aircraft for business purposes, sending representatives abroad and overseas. In doing so they are directly helping our export market and are thus entitled to a certain amount of assistance.

Another direction in which there would appear to be Government frustration rather than encouragement is in the matter of sales of surplus aircraft. A correspondent complains, in this issue, that his club has been very "unlucky" at no fewer than four disposal sales, having failed to obtain aircraft for which the club tendered.

To put it bluntly, it is alleged that the clubs, or at any rate this particular club, are not getting a fair deal in these sales, and that most of the aircraft go to "combines" rather than to the clubs. So long as the existing system continues, whereby the Ministry is not bound to accept any tender, the way is open for such complaints to be made.

Records

WHILE there is every prospect that the world's speed record will have been broken by a handsome margin by the time this issue reaches our readers, we are debarred from recording the figure by the fact that we had to go to press on Monday. The structural distortion found in the Meteor EE549 was rectified in less than two days, and a new rudder was thought to have cured the tendency of EE550 to fly left wing down.

CONTENTS

Outlook	205
Offensive Support	207
Here and There	211
Model-Makers' Mecca	213
Rolls-Royce Mobile Jet School	214
The KZ-III	215
Stringbag Plus	216
Gander Airport	218
Civil Air Licence School	219
Folkestone Races	221
Le Zoute Rally	222
Civil Aviation News	224
Correspondence	227
The Piston Engine	228
Service Aviation	230

Records of a different sort have been set up by the Avro Lancastrian *Aries*, which flew from Blackbushe, England, to Wellington, New Zealand, in 59 hours 51 minutes lapsed time. The *Aries* took in its stride two other records: Blackbushe to Karachi in 19 hours 14 minutes and Blackbushe to Darwin in 45 hours 3 minutes.

Good as these figures are, they might have been even better had it not been for the fact that icing conditions made it impossible to fly straight over the Alps on the first leg. The Merlin 24s of the *Aries*, which have given such outstanding service on this and previous flights, would have lifted her across without any fuss. But even as it is, the flight is a fine achievement by crew and flying equipment.

TRANS-WORLD VISITOR: Under the command of Air Comdre N. H. D'Aeth (seen above in the pilot's seat), and captained by Sqn. Ldr. J. E. Aldrich, *Aries* and crew from the Empire Air Navigation School arrived at Wellington, New Zealand, after a record flight of 59hr 51min from Blackbushe, Surrey. The previous best time from England to New Zealand, 60½ hours, was made by a Transport Command Lancastrian. *Aries* is a Rolls-Royce Merlin engined two-year-old Avro Lancaster, minus turrets but fitted with special navigational equipment and extra tanks to give a total fuel capacity of nearly 4,000 gallons. S./O. Tough, W.A.A.F. records by photograph the long list of places visited by *Aries* during the past year.

The explosion of a 4,000lb. "cookie," dropped by one of twenty Lincolns, is visible to the left of this view, which conveys an impression of the intensity of the bombing. On the slope in the foreground are target indicators dropped by a Mosquito.
Illustrated by "Flight" Photographs.

Convincing Demonstration Before Senior Officers at Westdown Ranges

VILLAGERS living in the pleasant country round Larkhill and Westdown, on Salisbury Plain, have become accustomed to explosions, fires and drifting smoke on near-by R.A.F. ranges, from which they are barred by Service Police, red flags and matter-of-fact notices. They are familiar, too, with the humming of Staff cars as they bump their way up the tracks leading to the ranges; but last Tuesday week they lined the approaches in force to watch high-ranking officers ascend in assorted transport—including "tripper" coaches—to a prepared enclosure. Children swarmed on haystacks and, though most of them could not have known it, they were about to hear, and in some cases to see, a demonstration arranged by the Offensive Support Wing of the R.A.F. School of Air Support, for what is known as the "Special Senior Course."

This designation hardly suggests that this four-day course, held once a year, accepts only Air Commodores (or equivalent rank) *and above*. Thus the nominal roll for the course recently concluded bore the following names: Air Marshal Sir Ralph A. Cochrane, K.B.E., C.B., A.F.C.; Air Vice-Marshals R. Ivelaw-Chapman, C.B.E., D.F.C., A.F.C.; C. B. S. Spackman, C.B.E., D.F.C.; T. C. Traill, O.B.E., D.F.C.; F. F. Inglis, C.B., C.B.E.; Air Commodores G. R. C. Spencer, C.B.E.; T. G. Pike, C.B., C.B.E., D.F.C.; and T. G. Bowler, C.B.E.

From B.A.F.O. came Air Vice-Marshal P. E. Maitland, C.B., M.V.O., A.F.C. The Air Ministry sent Air Commodores L. J. V. Bates and N. S. Allinson, C.B., and the Ministry of Supply, Air Commodore J. G. Franks. The R.N.Z.A.F. was represented by Air Vice-Marshal A. de T. Nevill, C.B., C.B.E., and the Royal Canadian Air Force by Air Vice-Marshal R. E. McBurney, C.B.E.

The Royal Navy party comprised Rear Admiral S. H. T. Arliss, D.S.O.; Capt. R. K. Dickson, D.S.O.; Capt. G. B. H. Fawkes, C.B.E.; and Capt. E. B. K. Stevens, D.S.O., D.S.C. Brigadier J. E. Leech-Porter, C.B.E., was the sole Royal Marine "student."

The Army sent sixteen officers—from Australia, New Zealand, India, B.A.O.R., ALFSEA, C.M.F., B.T.A., Eastern Command, Scottish Command and A.A. Command. The U.S. Army colonels, one from the Airborne Infantry and one from Signals, made up the imposing and, representative list.

In the special Enclosure out on the Westdown Range were some notable visitors—Air Chief Marshal Sir John Slessor, K.C.B., D.S.O., M.C.; Air Marshal Sir Norman H. Bottomley, K.C.B., C.I.E.; Air Marshal Sir James Robb, K.B.E.; and Lt. General Sir John Crocker, K.B.E., C.B., D.S.O., M.C. The VCIGS, Australia (Lt. Gen. Rowell) was there, and Major General Chilton. Rear Admiral Troubridge, 5th Sea Lord, and Rear Admiral Oliver, Admiral (Air) Lee-on-Solent, strengthened an already prominent Naval representation.

It will be gathered that this intimate and costly demonstration was to be something exceptional, but before describing the events it is desirable to give some explanation of the origin and work of the School of Air Support.

At an Air Ministry conference in September, 1944, it was agreed by all three Services that the scope of the School of Army Co-operation should be considerably widened and the name altered to keep in line with the current conception of Air Support. It was further agreed that the term "Air Support" was to cover assistance by air in amphi-

OFFENSIVE SUPPORT

bious assaults, land battles and airborne operations and the supply and maintenance of the Army by air. A Charter laid down that the School was

(a) to teach a common doctrine in air support by holding courses of instruction for all three Services;

(b) to study all matters affecting the air support of armies;

(c) to maintain close liaison with its counterparts at home and overseas and with Commands at home and overseas, and keep them up-to-date with current developments.

On matters of policy the School is directed by Air Ministry, through the Director of Training (Operations); it is administered by Headquarters, Fighter Command, and is organized as a Headquarters and two Wings. Headquarters, which is responsible for School policy and administration, is headed by the Commandant (at present Air Vice-Marshal L. O. Brown, C.B., C.B.E., D.F.C., A.F.C.) with an Assistant Commandant (an Army Brigadier) and a Deputy Assistant Commandant who is a Commander R.N. with Naval Air Arm experience.

Course Arrangement

Arrangement of the courses is handled by two instructional Wings—the Offensive Support Wing and the Transport Support Wing. The latter had arranged a demonstration of supply and equipment-dropping for the day following *Flight's* visit. Each Wing has a Group Captain as the Chief Instructor, with a Lieutenant Colonel, two Majors, a Wing Commander and two Squadron Leaders as additional instructors. The Offensive Support Wing has, in addition, two Lieutenant Commanders for instructional duties and a signals/radar officer.

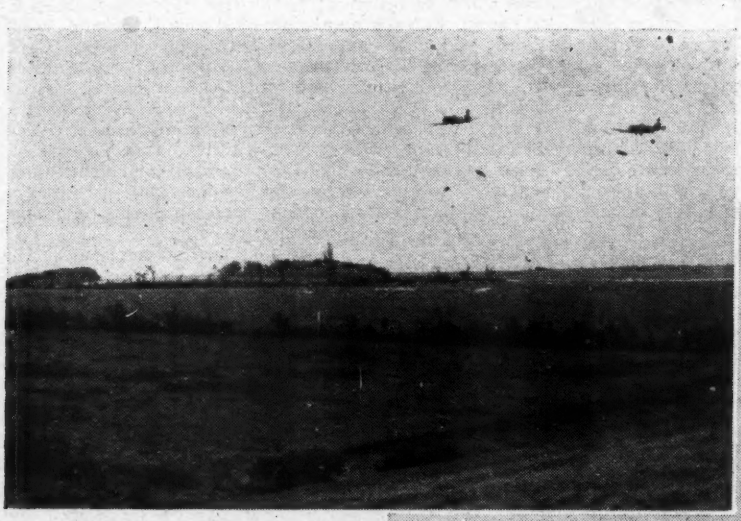
Students on the Intermediate course are acquainted with the principles of offensive air support as practiced by the R.A.F. and the Naval Air Arm, emphasis being placed on the organization and staff duties involved. Knowledge is imparted by lectures and by exercises designed to familiarize students with joint planning at various staff levels; these promote inter-Service discussion. Demonstrations, similar to that later described, are arranged to illustrate the weapons and methods of offensive air support.

At the demonstration (left to right): Air Vice-Marshals Spackman and Vincent and Air Commodores Bowler and Bates. In the background are Air Marshal Sir Ralph Cockrane and Major-Gen. Hull, Commandant of the Army Staff College.

The contribution of the Transport Support Wing to the Intermediate Course covers instruction in airborne assault, air transport operations and supply by air.

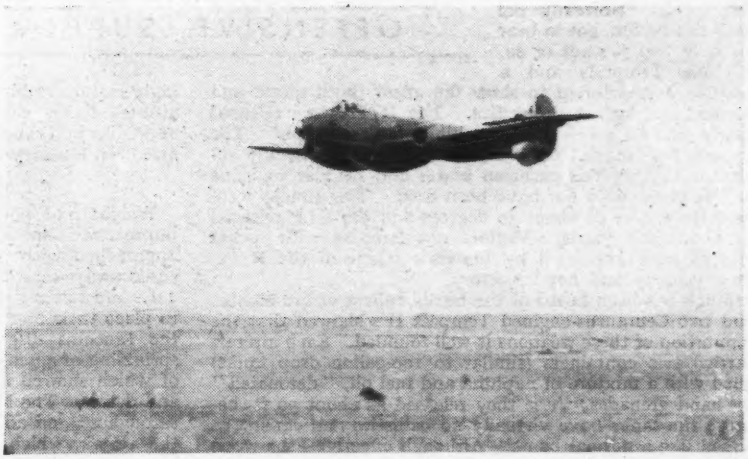
The Senior Course does not coincide with the Intermediate Course and, although the syllabus is generally similar, instruction is more concentrated. As already stated, the Special Senior Course occupies only four days and is designed to afford an opportunity for high-ranking officers to bring themselves up to date in matters concerning air support.

An important instructional asset is a "static" exhibition—a truly remarkable show and surely unique in any of the three Services. Complete aircraft on view in the hangars include



Two Centaurus-engined Tempest IIs demonstrate the incendiary properties of tanks filled with a mixture of naphtha and fuel oil. Although known in the Service as "firebombs," these missiles have virtually no ballistic qualities, and must be released from a very low level. The right-hand view shows the scraggy wood, which served as the target, being further thinned.

Air Vice-Marshal T. A. Langford-Sainsbury (left), with Air Vice-Marshal L. O. Brown, who commands the R.A.F. School of Air Support.



A Gloster Meteor III which, although fitted with early Derwents and carrying a large ventral tank, gave a remarkable demonstration of climb and speed.

a Horsa, Hamilcar and Hadrian, a Typhoon with full war load, a Spitfire and a Firebrand. There are engines and jet units supplied by manufacturers; guns; rocket projectiles; equipment for airborne troops; radar and air/sea rescue gear. In a ten-minute tour we noted a 57 mm gun, as fitted on the Mosquito XVIII (this gun is known officially as QF, 6-pdr., Class M, Mk. I); part of an American AN M65, 1,000-lb bomb with "Azon" tail; a T.51 proximity fuse for a 4,000-lb H.C. bomb; a model of the Airspeed AS 60 high-speed military transport, complete with model MT and loading doors which work; and a revealing model of the Windsor.

It is right that the description of the flying demonstration should be preceded by this somewhat lengthy dissertation on the school itself, for the demonstration is but one of the "lessons" taught. True, it is the most popular feature of the course (for even Air Marshals admit to a liking for watching inert and useless objects being blown up) but the planning is essentially objective.

The flying demonstration was perfectly planned, as well it might have been, considering the status of the spectators and the exclusively Service nature of the whole show.

The opening item was dive bombing by four Spitfires. They came down at 45 degrees or so and released their 250-lb bombs on a wood marked for them by the artillery with pink smoke. This form of attack is normally carried out from about 6,000 ft and the bombs are released at 2,000 ft, but at the time of the demonstration the height of the cloud base reduced these figures. If the bombs are released from too low an altitude the aircraft may "mush" into the ground on pull-out or be damaged by their own bombs. Casualties in dive-bombing are not usually heavy by comparison with other methods of attack used by close-support squadrons. The announcer was careful to explain that although the Spitfires were using 250-lb bombs the larger Typhoon and Tempest can carry two 1,000-pounders apiece. The results witnessed were certainly accurate enough to "neutralize" the wood.

(Left to right) Group Capt. Macdonald and Group Capt. Widdows with Air Vice-Marshal Sir Hugh W. L. Saunders.

Skip Bombing

Skip bombing was the subject of the next demonstration, by four Spitfires, each carrying two inert 250-lb bombs. The target was a pair of tanks about 800 yards from the spectators, but in the field skip bombing would never be used against small targets of this sort. The bombs would have delayed fusing to prevent the aircraft being damaged by their explosion. It was instructive to notice how high the bombs bounced after striking the ground; occasionally they exceed the height of the aircraft. An interesting point is that this form of attack is normally practised by two-seaters, e.g., Mosquitos, because the pilot of a single-seater finds difficulty in navigating while flying for appreciable periods at low level.

Ground strafing by four Spitfires was intended to demonstrate the effectiveness of the fixed-gun armament of modern fighters against "soft-skinned" targets; this it succeeded in doing most convincingly. After a few bursts a derelict Hurricane and a Spitfire about 800 yards from the spectators were blazing, and the MT was well riddled. The accuracy of the shooting was remarkable but by no means exceptional in the Service. It is not always appreciated that this form of attack, although permitting great accuracy, allows very little time for aiming and firing, even though the aircraft may be travelling much below their

OFFENSIVE SUPPORT

full speed. Normally the guns can be brought to bear for only two seconds or so.

Three Tempests and a Spitfire were selected to show the effect (both moral and material) of rocket projectiles. The R/Ps were released singly and in salvo and one hit a tank squarely. The rockets had normal 60-lb heads and it was generally regretted that on this occasion newer and heavier weapons of this class could not have been fired. The attacks were made in a dive of about 30 degrees and the R/P released at about 600 yards. Visitors not familiar with rocket attacks were impressed by the eerie whine of the R/Ps, their velocity and flat trajectory.

Much has been heard of the terrible effect of fire-bombs, and two Centaurus-engined Tempest II's showed that the reputation of these weapons is well founded. Each aircraft carried two containers (similar to 100-gallon drop tanks) filled with a mixture of naphtha and fuel oil, "detonated" by hand grenades; these they released at about 50 ft, because the tanks have virtually no ballistics and cannot be aimed like a normal bomb. Although effective—the wood selected as the target blazed in an alarming manner—this type of attack is dangerous against targets heavily defended by light flak.

By arrangement with the manufacturers of the various aircraft a Supermarine Spiteful, Gloster Meteor and de Havilland Vampire were brought over for demonstration. A D.H. Hornet was to have been included but while *en route* to Westdown the pilot called up to say that a small fire had started in the cockpit.

The Spiteful came over at a speed which must have approached its "maximum level" figure of 470 m.p.h. Turning, the pilot demonstrated its rolling capabilities and finally lowered the flaps and undercarriage to pass the enclosure at low speed and low level.

Meteor Performs

A Meteor IV was to have performed but the aircraft which materialized in its place was a short-nacelle Mark III carrying a 180-gallon ventral tank. The comparatively low-powered Derwents and the extra drag of the tank did not prevent the pilot from giving a commendable exhibition of climb and speed. There is no doubt that the Meteor, even though of this dated Mark, will prove an outstandingly effective close-support weapon. The pilot's view and the concentration of armament are important assets in this connection.

The Vampire gave just the show which one has come to associate with this amazingly manœuvrable single-jet fighter. The high-speed, low-altitude banks enabled spectators to glimpse the interior of the cockpit, though no one dared claim to have recognized Mr. Geoffrey de Havilland. He was, in fact, the pilot.

Twenty Lincolns

Weight and power, suitably demonstrated, can be as impressive as speed, and all eyes turned as twenty Lincolns approached with open bomb doors. Their target—2,700 yards away—had been marked by Mosquitoes with 250-lb T.I.s and to the right, and ahead, of the markers they were to place their bombs. Approaching in an open line-astern the Lincolns disgorged showers of 500-pounders and a sprinkling of 4,000-lb "cookies," the flash and dark smoke of which showed fiercely amid the swirl of lighter smoke and debris. The Master Bomber kept up his commentary throughout and added a word in praise of the accuracy of the attack, which was echoed by all. A "Long Stop" Mosquito had been circling to ensure that no bombs fell near friendly troop positions, and another Mosquito put down a yellow marker which signified "cease bombing."

Army students and visitors appreciated the demonstration of "air briefing" and the use of a "cab rank" of Spitfires, which strafed positions as requested. It was shown how a Contact Car reduces the period between request and execution. The work of the F.C.P. (forward control post) was also exemplified. W/T communication ended with a snatch of conversation (air-to-air) which sounded like "Slow up a bit Dickie; I can't catch up."

Not the least interesting feature of this demonstration was the jinking of the Spitfires as they ran up to their target and the way in which they "hugged" the contours of the ground as they finally broke off.

Perhaps the most significant item was bombing by four Mosquitoes under radar control. The directing set is known as an MRCP and is used when the target is obscured. The order for release was given from the ground (from a point 25 miles distant) but one understood that a bomb aimer was carried as a precaution. The aircraft were flying at 10,000-12,000 feet.

Having witnessed this comparatively unspectacular event the distinguished onlookers dispersed—impressive, and impressed.

GETTING READY FOR RADLETT: Rolls-Royce Nene jet-propulsion units are being installed in the outboard positions on an Avro Lancastrian which will form one of the most interesting exhibits at the S.B.A.C. Show on September 12–13.

HERE AND THERE

Air League Chairman

MAJOR R. H. MAYO, the designer of the Short-Mayo composite aircraft, has been elected chairman of the Air League of the British Empire in succession to Air Chief Marshal Sir Philip Joubert, now Director of Public Relations at the Air Ministry.

Belgian Air Rally

THE Royal Aero Club has received an invitation, through the Royal Aero Club of Belgium, to take part in the International Air Rally which is being organized by the Ghent Aviation Club at St. Denis-Westrem-Gand on September 7th and 8th. The invitation also embraces British clubs affiliated to the R.Ae.C.

D.H. Down Under

MOSQUITOES and Doves for the Australian and New Zealand market will probably be produced in a new factory which the de Havilland concern plans to erect at Bankstown Airport, near Sydney. Later it is possible that Vampires will also be manufactured there.

A Reuter message from Sydney last week quoted Major Allan Murray Jones, managing director of de Havilland Proprietary, Ltd. (Australia), who has just returned to Sydney from Britain, as saying that it was the parent firm in Britain which hoped to establish the new Australian plant.

Battle of Britain Sunday

HEADS of churches of all denominations have authorized collections to be taken on Battle of Britain Sunday (September 15) for the R.A.F. Benevolent Fund. Proceeds will go to relieve distress among past and present members of the R.A.F. and their dependents.

FLYING SCHOLARSHIPS which will provide training for "A" licences are to be awarded to chosen members of the Women's Junior Air Corps who are over 18. Ex-Flt. Lt. C. A. Nepean Bishop is giving instruction to some of the candidates at the United Services Flying Club, Elstree.

Lord Riverdale, the chairman, states in an appeal that the Fund is facing increasing numbers of claims. In the first six months of 1946 16,534 new cases were aided—the highest rate so far.

Battle of Britain Sunday will be observed each year on the Sunday nearest to September 15. This year September 15 falls on a Sunday for the first time since 1940.

For Pathfinders

THE Pathfinder Association now has its own publication—a quarterly bulletin called *Pathfinder Newsletter*—whose chief function is to keep its members *au fait* with the Association's activities and in touch with each other. Members who are unable to get up to London to visit the club at 115 Mount Street, except perhaps at long intervals, should find it particularly useful.

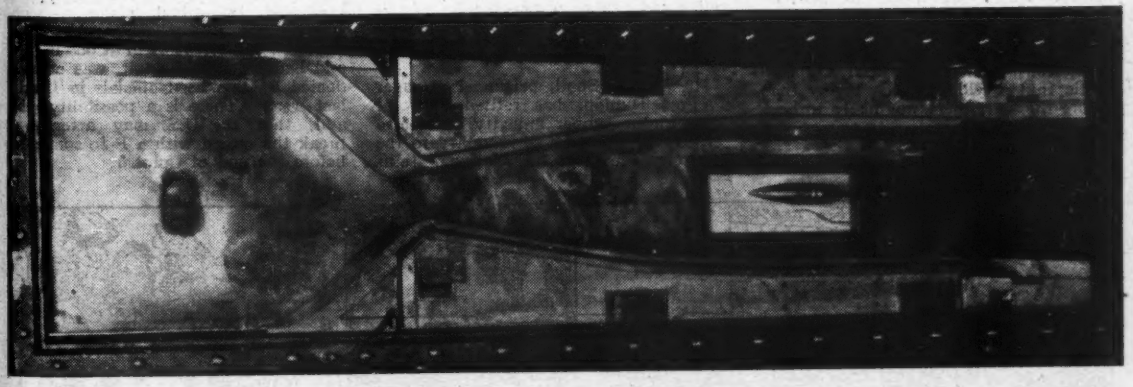
Incidentally the accommodation at Mount Street has become too small for the crowd of members and their guests, so new premises just off Piccadilly are to be taken over shortly. These will have the advantage of a restaurant to provide full-sized meals; Mount Street can only manage snacks.

The first number of *Pathfinder Newsletter* (why didn't they call it *The Marker?*) points out that its future success will depend on the active support of members in sending along articles, letters, stories, etc., so that its pages will really reflect their own activities.

Amende Honorable

OUR apologies are due to the young designer of a tailless model aircraft, Alan Arnold, of Bournemouth, who competed in the recent Bowden International Trophy contest at Heston—his first big competition.

Owing to a misunderstanding with an official of the S.M.A.E., the photograph of Arnold and his machine which appeared in *Flight's* account of the meeting (published in our issue of August



PROJECTILE RESEARCH: A specimen shell is here shown mounted in the working section of the N.P.L. 11in. supersonic tunnel. The fan is powered by a 1,500 h.p. motor and wind speeds up to 2.5 Mach number are possible.

HERE AND THERE

15th) was wrongly described as one of Mr. A. H. Wilson's models held by a young admirer.

The error arose because the official had not seen the photograph, and we had not had the pleasure of Arnold's personal acquaintance.

Incidentally, although the little power unit of Arnold's excellent model proved temperamental in this contest, it has flown very well on many other occasions and is a distinct credit to its youthful designer and constructor.

Display at Woodford

NEARLY 10,000 visitors turned up at Woodford airfield when A. V. Roe and Co., Ltd., gave a display of their own aircraft there in order to raise funds towards a community centre at Woodford as a practical war memorial to local men who lost their lives in the war.

Aircraft parked for public inspection attracted great attention, especially from the younger generation, who swarmed on, over, and into them whenever permitted to do so.

An impressive take-off in a Tudor II was made by Mr. Jimmy Orrell, Avro's assistant chief test pilot, and a flight of Lincolns swept over the Pennines from Doncaster to give a low fly-past while two-way R/T contact was relayed to the ground from Flt. Lt. Coates.

The programme wound up with some gliding by No. 183 Squadron, N.W. Command, including exhibitions by instructors Peter Thorn and P. Wilson.

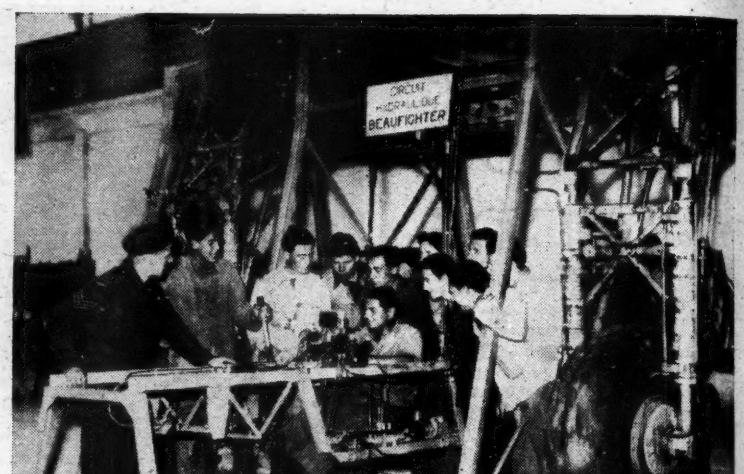
The display raised the useful sum of about £450 for the fund.

No More Synthetic Rubber

IMPORTS of synthetic rubber have now stopped, and after October nothing but natural rubber will be used for tyres, Mr. F. D. Ascoli, chairman of the Rubber Growers' Association, stated in London recently.

"Meanwhile," he said, "manufacturers are exhausting existing stocks of synthetic, and we have decided to press the Board of Trade for the return to a free market as soon as the present agreement with U.S.A. ends on December 31st. We are anxious to stand on our own feet and to ascertain the real value of natural rubber as against its new competitor, synthetic rubber. With the free market which we hope to see re-established the present price of 1s 2d a lb is likely to come down."

Mr. Ascoli added that although the world consumption of natural and synthetic rubber will be much higher than before the war, there was likely to be a surplus of it in 1947.



HELPING HAND : An R.A.F. sergeant instructing a French class at Rochfort on the Beaufighter hydraulic system. These classes are part of the scheme for British help to French Service aviation and the industry.

News in Brief

TO relieve an acute shortage of ice-cream in Tasmania, A.N.A. cargo aircraft carried three capacity loads of it, totalling 18,750lb, from Melbourne to Hobart and Launceston.

* * *

Valentina Stoyanovskaya, the 36-year-old Soviet airwoman now engaged as a transport pilot, recently topped 1,000,000 air miles. During the war she flew supplies to the Russian fronts.

* * *

Twenty-seven Indian Moslems from South Africa recently chartered a B.O.A.C. flying-boat to take them on a pilgrimage to Mecca—a sharp contrast with the traditional way of making the journey by sailing boat.

* * *

A new 27-seater airliner has been designed by Sergei Ilyushin, who was responsible for the Stormovik low-level attack bomber. It is a twin-engined aircraft with a cruising speed of 220 m.p.h. and a range of 1,500 miles. As a freighter it carries three tons; the crew numbers five.

* * *

Mr. Walter Bond, personnel manager at Fort Dunlop, has retired after 54 years in the rubber industry. He also retires from the post of secretary to the tyre employers on the National Joint Industrial Council for the rubber manufacturing industry. He is a Fellow of the Institute of the Rubber Industry.

* * *

Mr. R. Gresham Cooke is retiring from the position of secretary of the United Steel Companies, Ltd., to become director of the S.M.M. & T. He will be succeeded by Mr. R. Peddie, B.A., on October 1st.

* * *

A Lincoln is being specially equipped at Melbourne to map the strip in Central Australia which is being considered for the rocket projectile experiments. As this area has practically no land marks a high degree of navigational skill is called for, and three special cameras will be operated simultaneously. The necessary "mods" were designed by the R.A.A.F. experimental unit at Laverton.

* * *

The rumour, current in London aviation circles lately, that the jet-propelled Lockheed P-80 had made a secret attempt on the World's Air Speed Record (while it was still at 606 m.p.h.) and had failed to beat it, was officially denied by Lockheed officials in London last week. There is a possibility, they add, that the U.S. may attempt to break the record with a P-80 some time before the end of October.

AIRSTRIP . . . No. 29

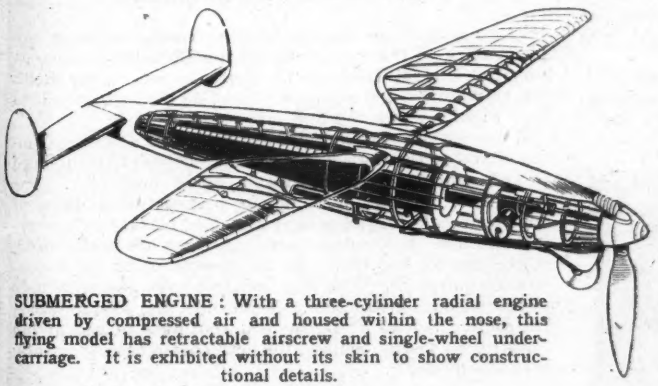
Model-Makers' Mecca

Aircraft Prominent in 21st Exhibition : Wide Range of Design at the New Royal Horticultural Hall

THE Model Engineer Exhibition which opened on August 22nd in the New Royal Horticultural Hall at Westminster, London, S.W.1, is notable for two things. It is the coming-of-age show, and its organization was shared for the first time by the Society of Model Aeronautical Engineers and the Society of Model and Experimental Engineers in addition to the chief promoters, the proprietors of *The Model Engineer*. The exhibition closes next Saturday evening, August 31st.

So far as *Flight* is concerned, the main interest naturally lies in the model aircraft exhibits which are prominent both for their numerical strength and for the general excellence of their design and craftsmanship. Nevertheless, even the most ardent devotee of model aircraft could not walk round the spacious hall without having his attention constantly drawn from the winged exhibits by the astonishing variety of other models to be seen—models which range from minute electric motors no bigger than a thimble, via racing cars, speed-boats, sailing ships, traction engines, agricultural machinery, marine and stationary engines, and so on, to railway models varying in size from the natty little "00" gauge to hefty scale jobs that could pull (and in one case actually was pulling) a trainload of some half-dozen adult passengers with ease.

Altogether there were some 270 models entered in the various competitions by enthusiasts aged from eight to seventy-three, besides those in the "loan" section, the collective exhibits by clubs and societies, and the trade section.

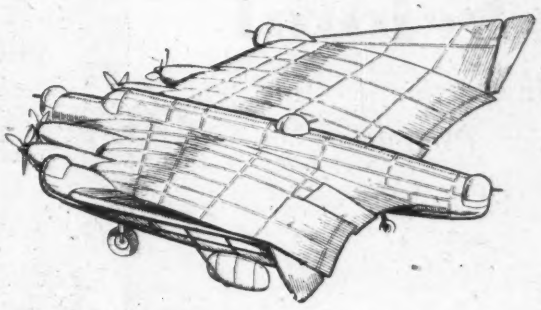


SUBMERGED ENGINE : With a three-cylinder radial engine driven by compressed air and housed within the nose, this flying model has retractable airscrew and single-wheel undercarriage. It is exhibited without its skin to show constructional details.

The model aircraft in this (or any other) show can be divided into a number of different categories, namely, solid scale models such as are commonly used for identification instruction by the Services, flying models which are designed for performance without regard to very much else, flying scale models of full-sized aircraft, and, finally, purely experimental designs. In the first-mentioned category the most interesting examples are those made entirely from match sticks. These are, of course, small enough to stand on the palm of a child's hand, but they are perfect copies of well-known types, and nobody would know they were made from such unpromising material unless told so; as demonstrations of their makers' patience and dexterity they would be difficult to beat.

Two Unusual Designs

The flying models are almost all high-wing or shoulder-wing types, and include some particularly fine examples of the Wakefield Trophy type employing rubber-power, but most of the flying scale models are powered by miniature two-stroke engines of various capacities up to about 20 c.c. Experimentalists among model aircraft engineers are to-day chiefly interested in flying-wing and tailless designs, of which a number were exhibited, and one of the most outstanding from the point of view of originality is an ultra-modern tailless bomber, illustrated on this page, with four engines and five power-operated gun-turrets. This suggested design embodies control surfaces on the upturned wing tips and at the roots of the trailing edge, plus small additional keel surfaces beneath the wings.



BOBBED BOMBER : A futuristic design for a tailless bomber with four engines, five gun-turrets, and fixed vertical fins beneath the outer wing panels. This bat-like exhibit is not a flying model.

Another original model shown here is a shoulder-wing type with twin fins and rudders, and powered by a three-cylinder radial, compressed-air engine housed within the streamlined nose and fed from a cylindrical air bottle in the fuselage. The airscrew blades are hinged at the trailing edge of the roots so that when the engine stops they automatically fold back along the nose to reduce drag and prolong the glide. The single-wheel undercarriage is also mechanically retracted after take-off by means of a small cylinder and plunger actuated by an air valve.

Among the miniature i.c. engines intended for model aircraft (practically all of which are single-cylinder two-strokes) is one exceptionally fascinating seven-cylinder radial two-stroke in which the mixture is fed direct to the combustion chamber from a rotary blower mounted concentrically on the back of the crankcase and driven from the mainshaft. This realistic-looking power-unit is so much larger than the largest of the conventional units that an airframe to suit it would surely be an outside in models.

Finally there are some very well-finished model sailplanes which show that increasing attention is being paid by amateurs to this highly specialized branch of model aircraft engineering.

No exhibition would be complete, of course, without its quota of working models, and the aircraft section in this excellent display competes very ably in this respect with the several railway systems seen in active operation. Almost in the centre of the hall is an arena where, in addition to a tethered "scale" Miles Magister flying round a pole by electrical power, examples of the delicate microfilm indoor models are demonstrated in free flight. These fragile aircraft weigh but ½oz and their gossamer wings are so lightly loaded that, with their airscrews merely ticking over, they float at almost zero m.p.h.

THE "OCEAN TIMES" REAPPEARS

WITH the sailing of the R.M.S. *Queen Elizabeth*, the world's largest liner, on her maiden voyage on October 16th, the publication of the *Ocean Times* will be resumed as the official daily newspaper for Cunard White Star passengers. As in pre-war days, it will contain the latest news received by radio telegraphy each night throughout the voyage. The *Ocean Times* is the first to reappear of the newspapers which before the war were published at sea on a number of the larger vessels. It is published by Wireless Press Ltd., one of the Associated Iliffe Group, who also published the *Anchor Line News*, *Canadian Pacific Gazette*, *Wireless News* and *Wireless Press*, and it is fitting that the first post-war ocean newspaper should be on the finest achievement of British shipyards.

Rolls-Royce Mobile Jet School

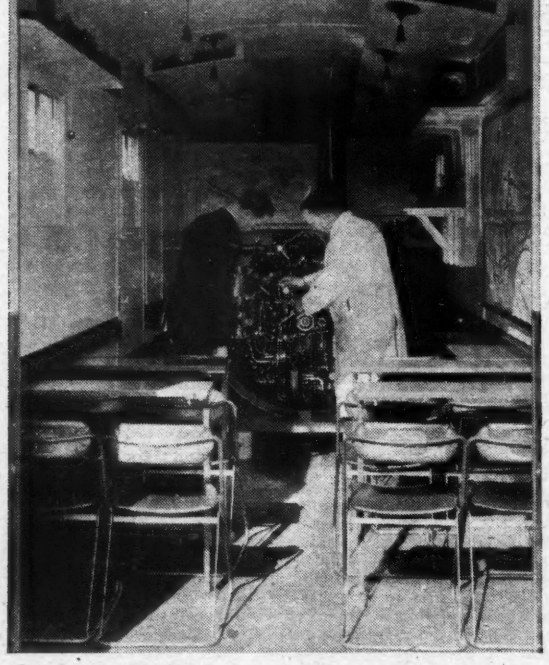
Instructional Unit on Jet Propulsion for Fighter Command

The Service "issue" 10-ton trailer lorry which houses the first R-R gas turbine Instructional Unit.

DURING the war we saw the advent of the mobile instructional unit designed as a supplement to manufacturers' courses in order to take the latest gen to the men on the job who could not be spared from their duties.

Something of a similar state of affairs now exists in R.A.F. Fighter Command. The urgent requirements of preliminary training for all engineer officers and fitters on Rolls-Royce gas turbines has rendered necessary facilities supplementary to those available in the Rolls-Royce Instructional School at Derby. To meet the emergency Rolls-Royce designed and equipped a mobile instruction unit to tour Fighter Command and other stations.

A 10-ton van was supplied by Technical Training Command and in three weeks Rolls-Royce completely equipped it and sent it on tour with a works instructor. The equipment includes a complete part-sectioned Derwent engine, and all instructional aids such as blackboards, working diagrams, lantern and cine-projectors are neatly fitted in the interior together with component parts for demonstration purposes. The first course covers approximately eighteen hours instruction. Meanwhile, the jet-propulsion Instruction School at Derby still continues to run at full capacity on 14-day courses, the 20th course having recently been completed.



Interior of the mobile school showing part-sectioned Derwent, wall diagrams, component exhibits, and folding desks and chairs.

"HASTINGS" CEREMONY

THE Mayor and Corporation of Hastings will be taken for a flight in the new Handley Page Hastings on Wednesday, Sept. 4th. Previously at Radlett Airfield, Herts, the Mayor will have named the aircraft by breaking a bottle of good wine over it.

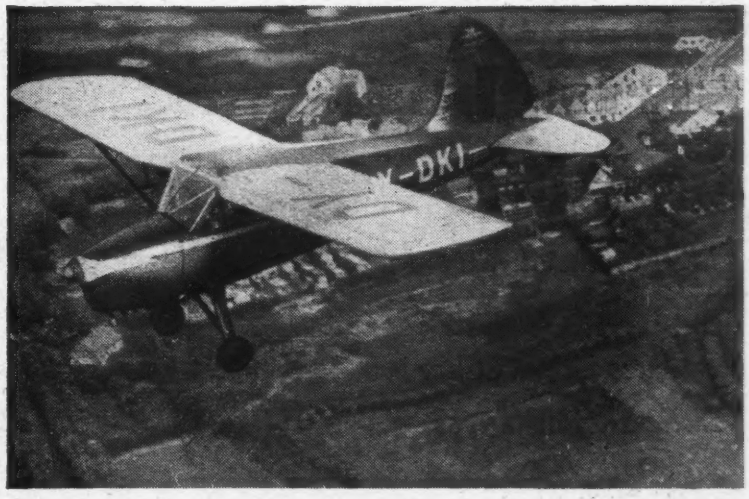
The name Hastings has been given to this R.A.F. version of the Hermes because it is one of military significance in British history. Largest military transport so far built for the R.A.F., it is already in series production as the standard long-range R.A.F. transport, and deliveries are expected to begin shortly.

FORTHCOMING EVENTS

Sept. 9th.—Ministry of Civil Aviation demonstrations of technical radio equipment.
Sept. 12th-13th.—S.B.A.C. Flying Display and Exhibition, Handley Page Airfield, Radlett, Herts.
Sept. 14th.—R.A.F. "At Home" Day.
Sept. 15th.—R.Ae.S. Garden Party, Handley Page Airfield, Radlett.
Sept. 22nd.—Danish "Flying Day." Invitation from Danish Clubs.
Nov. 2nd.—First reunion of No. 205 Group R.A.F. in London.
Nov. 15th.—Paris Aero Show, Grand Palace, Champs Elysees.
Nov. 15th.—Glasgow Engineering Exhibition, Kelvin Hall.

The KZ-III

Impressions of Flying a Danish Two-seater With Cirrus Minor Engine



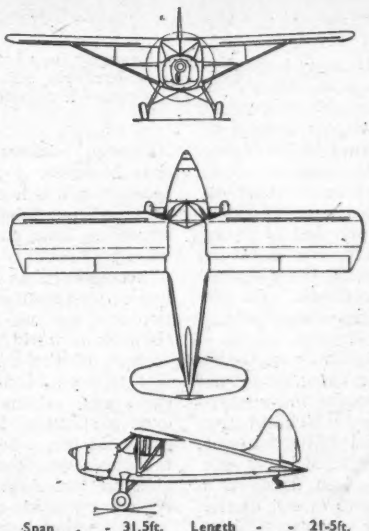
A KZ-III Lark 100 b.p. (Cirrus Minor Mk. II Engine) over Knocke in Belgium. The cruising speed is 103 m.p.h.

FEW light aircraft visiting this country from abroad have caused more interest than the Danish KZ-III. During its brief demonstration at Hanworth and other airfields, quite a number of British pilots were able to fly it and in view of its excellent characteristics spoke freely in its praise. A brief description with data and a photograph of the cockpit interior appeared in *Flight* of July 25th.

While visiting Le Zoute in Belgium, as reported on pp 222 and 223 of this issue, another opportunity was afforded for a member of *Flight's* staff to fly the KZ-III. As is his custom with pilots who are interested, Mr. Drescher (Sales Manager of Skandinavisk Aero Industri A/S, 26 Vestergade, Copenhagen) explained briefly the instruments and controls, and then walked away leaving our representative to start-up and fly the aircraft himself—such is his confidence in the KZ-III's simplicity and lack of vices.

The interior of the cockpit is rather similar to that of the Hornet Moth, and the impression is supported by the "split" central stick and the luggage shelf behind the seats. The doors are not upholstered but the cabin is quite quiet, and it is possible to talk normally while flying. The Cirrus Minor II engine is smooth and well mounted, and the minimum of vibration is felt in the cockpit at full power.

When taxying, extremes of rudder movement are achieved more comfortably than on many comparable aircraft. The brakes, controlled by a large hand lever on the left side of the panel and by differential rudder effect, were satisfactory. Forward view on the ground is quite good. There are four flap positions, and a number two is used for take-off. When the speed reached about 65 km./hr. with tail up the KZ-III rose gently off the ground without any appreciable backward movement of the stick. It climbed well and seemed equally at home when climbing at any speed between 75 and 100 km./hr. During initial climb 300 metres/sec was indicated at 80 km./hr. (50 m.p.h.). At low speeds there is not much change in trim and stick position when bringing flaps in from the take-off position; there is more change, however, at rather higher speeds and when lowering full flap.



Span - - 31.5ft. Length - - 21-5ft.
Height - - 6.9ft. All-up weight - 1435 lb.

Low-speed Performance

Perhaps the most striking flying characteristics are the ability to maintain control during extraordinarily steep climbs at low speed, the extremely tight prolonged turns which can be made without loss of height, and the completely docile stall with or without flap.

With stick on the back stop and rudder completely stalled, there is still a little aileron control. The A.S.I. reading (with passenger up) was 42 km/hr, and the rate of descent very low. Recovery is immediate, and when the KZ-III was finally induced to stall almost violently by using full engine and flap with stick in the full backward position, the left wing dropped in the start of a spin, but full recovery was effected with the loss of approximately 50ft. It has fixed slots.

Although the aircraft is relatively short, it has good fore-and aft control and positive feel until touch-down at between 55 and 60 km/hr.

In level flight at 1,000ft the speeds achieved were almost exactly as claimed by the makers. They were: At 2,500 r.p.m. (maximum), 113 m.p.h.; at 2,300 r.p.m. normal cruising), 103 m.p.h.; at 2,100 r.p.m. (economical), 91 m.p.h.

Later production aircraft are to have extra transparent panels at the side behind pilot and passenger and in the roof, and this should remove what appears to be the only criticism of the KZ-III, namely, poor rearward view. The present standard provision for carrying a stretcher which can be loaded through a large hinged panel on the port side of the fuselage is to be abandoned.

For the time being the KZ-III is only to be sold in Denmark and "dollar" countries, but it will still be an attractive proposition if restrictions are raised next year and purchase is possible here. A four-seater with 125 h.p. engine will soon be ready for its first flight.

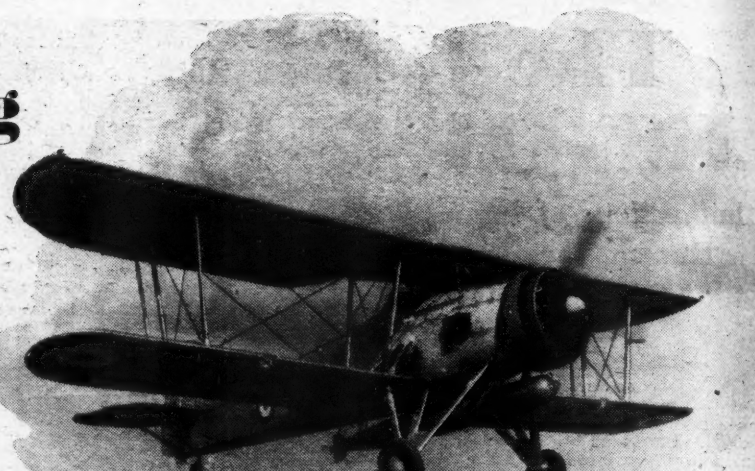
A KZ-III demonstrator (white), and the first machine to be delivered to the Danish flying clubs (blue) are seen arriving at Le Zoute.

IN THE AIR—XIX

Stringbag Plus

The Perennial Swordfish : Simplification Rest-cure : Two Other Little-known Types

By "INDICATOR"



Strangely incongruous though the Swordfish may appear to modern eyes, this aircraft could take it and carried a prodigious—if sometimes unairworthy—load of anything from bombs to bicycles.

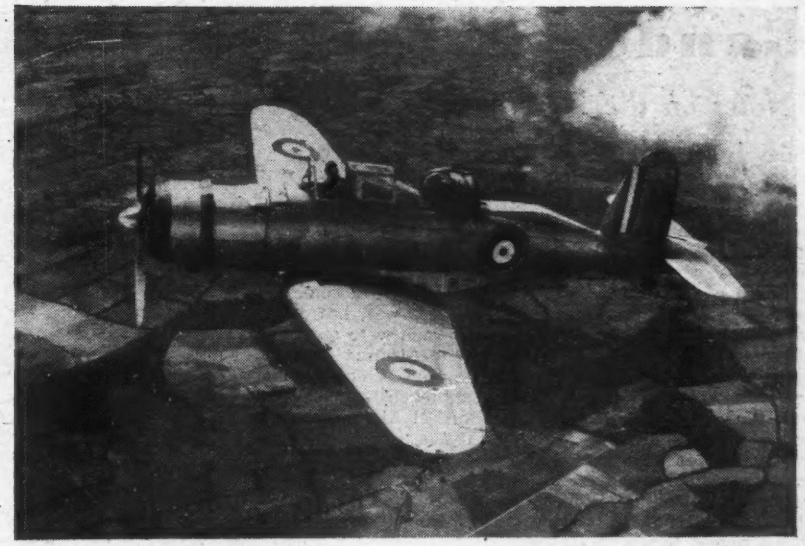
ONE of the more pleasant war holidays—at least during the short periods of summer—from the normal military aircraft flying routine was that of being given a delivery or test job with the Fairey Swordfish. The routine at the average maintenance unit involved one in more or less continuous concentration, since we were habitually leaping from one then-modern aircraft to another, with a choice of anything up to a score of different types. The rest-cure effect was simply that of flying something with which there was no need for concentrating on "drill-sequence," or on memorising both the different positions of the hydraulic and other controls, and the varying revolution and boost figures for take-off, climbing and cruising flight.

The Swordfish, with its fixed-pitch airscrew, fixed undercarriage, and unflapped wings, was virtually a one-control aircraft—that is, if one discounts the movements of the rudder pedals and control column which, in any complicated aircraft, are pushed around quite without conscious volition. Furthermore, one felt it to be so safe that the only real personal risk involved in flying this airship was that incurred in climbing up to or out of the pulpit-like cockpit just behind the centre-section. Although without normal complications, the Swordfish did, however, possess one somewhat strange control—a means by which the aileron droop could be increased to provide something in the way of mildly flapped characteristics. This control was never used in the ordinary way.

Accustomed as one was to rushing around the sky in little transparent canopies, within which one had no particular sensations either of motion or of connection with the outside world, one really felt, when sitting in the open cockpit of the Swordfish, that one was truly airborne. Not only could the air be almost seen as it passed over the wings, but the continuous draught reminded one that even a speed as low as 90 knots could produce quite a gale. In front, beneath the narrow-chord engine cowling, the valve gear could be seen in action, while the metal airscrew flailed quietly round to the accompaniment of a typical reduction-gear rattle from the Pegasus.

I remember being somewhat disturbed during my first

For its time—and quite apart from its original form of construction and consequent load-carrying capacity—the Wellesley was quite an advanced type, with retractable undercarriage and split trailing-edge flaps. The Wellesley's world's long-distance record, made in 1938, was not beaten until this year (by a Super-Fortress).



Developed from the fighter-bomber Skua, the Roc carried a four-gun turret. The former's up-turned wing-tips were replaced by dihedral from the centre-section.

trip in a Swordfish because I could find no obvious means of checking the fuel supply. Even the fact that I had unbounded (if false) confidence in an ability to put the Swordfish down in any of the fields below did not entirely remove a certain anxiety. It was only afterwards that I discovered that the fuel contents gauge could be seen through a hole in the dashboard, after this gauge had been electrically illuminated.

The particular Swordfish which our unit held ran at quite alarmingly high oil temperatures. This, too, was a source of minor anxiety as I progressively reduced the already low boost in an effort to keep the figure below a supposed danger mark. Evidently these Swordfish had had their coolers modified for Arctic flying conditions—or else someone had failed to connect the oil cooler cut-out control. Unlike any then present-day aircraft the fore and aft trimmer was a genuine incidence-changing gear, and the rudder-bias, which was adjusted by a little wheel on the right, was by elastic cord. This, one found, was a good deal more powerful than that used in a Tiger Moth and it was as well to remove as much of the tension as possible before throttling right back.

Another somewhat different naval type which occasionally appeared at R.A.F. stations was the Roc—a turret-armed variation of the original Skua fighter-dive-bomber. Although the latter type continued to be used throughout the war, at least for training radio operators and gunners, I am not quite sure what happened to the fair number of Rocs which were manufactured. From the flying point of view, the two were somewhat similar. One sat over the leading edge and behind a particularly deep bullet-proof screen, and had the feeling, in fact, of being able to look right over the nose. This feeling was particularly marked while taxying—with the knowledge that the aircraft was distinctly nose-heavy. One was abjured to empty the forward tank first on all flights, to use the brakes with care, and to organize at least one unhappy chap on the tailplane while one was taxying on soft ground or in a strong wind.

Since it was, so to speak, the prototype from which the Wellington series were developed, the Wellesley should perhaps have been included when I was talking about this series some months ago. Certainly, no one could have missed the family resemblance, either in handling or general appearance, and the wings wilted comfortably in the characteristic geodetic manner.

In the early days of the war, there were at least one or two Wellesleys loitering at Maintenance Units in this country, but the type saw service only in the Middle East and was, I believe, used operationally at a time long after more up-to-date aircraft had been appearing in quite large numbers over here. However, if the war had actually started when it possibly should have done—at the time of Munich—the Wellesley might well have been our standard long-range bomber. As the successful long-distance record flight showed, this first example of geodetic construction capable of carrying quite a lot.

From the A to B flying point of view, the Wellesley could hardly have been easier, and the only criticism concerned the use of spectacle-type aileron controls in such a comparatively small cockpit. The spectacles were very much in the way and considerable sleight-of-hand movements were necessary to reach and re-set the directional gyro.

ANGLO-AMERICAN COMBINATION

The first of the Trans-Canada Airlines' Douglas DC-4M on the runway at Montreal before its first test. This type, which has been developed and built by the Canadair plant, is a special version of the Skymaster, with Merlin 620-series engines, of which details were given in a previous issue. It will be used on the T.C.A. trans-Atlantic and trans-Pacific services.

Gander Airport

Notes on the Newfoundland Stage for North Atlantic Airlines

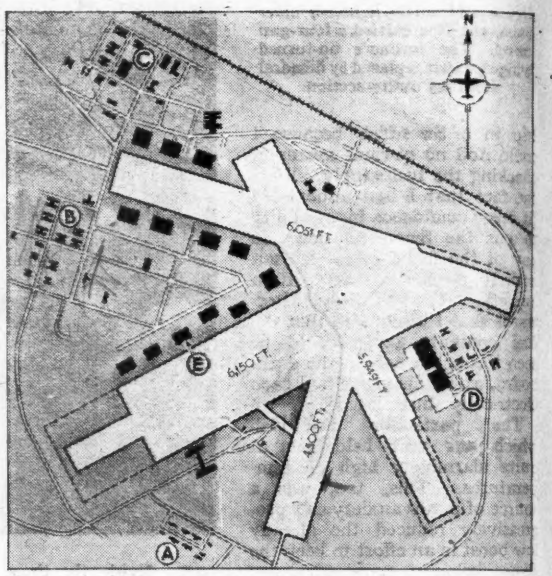
ACCORDING to the circumstances of one's first introduction to Gander, the name may bring to mind a picture akin either to Paradise or Purgatory. There were those who first saw a great expanse of wild, untouched country which, through their labours, was to become an airport; those in uniform who, during the war, heard the dreaded words "posted to Gander," which were regarded as somewhat synonymous with "sent to Alcatraz"; those who with relief saw Gander as *terra firma* after the long Atlantic crossing, or who rather apprehensively saw it as a last foothold before the West-to-East Atlantic flight; finally, there are those who think of it as a peaceful, remote sanctuary and fisherman's paradise.

Situated as it is on the Newfoundland coast, it is certainly isolated and wild in winter time, hence the R.A.F. and R.C.A.F. wartime impression. The country round about has a rugged beauty in all seasons.

After long service as an air transport and ferrying base, it has now become a most important link in the North Atlantic airlines' passenger route. It is in regular use by B.O.A.C., Pan American, American Airlines, T.W.A., Air France, K.L.M., S.I.L.A., and is served also by T.C.A., who fly a twice-daily Lockheed 14 schedule from Dorval *via* Moncton and Torbay. By rail it takes as much as twenty hours to reach St. Johns, which direct (by air) is only 150 miles away.

Gander, which has now been handed over to the Newfoundland Government, is still under development, as an airline transit airport. Accommodation and runways are adequate, and equipment, which includes radio range, will shortly profit by the addition of S.C.S.51.

In wartime the population was 7,000, but this has now fallen to about 800. In the illustration only the principal buildings are included. "A" indicates the new quarters taken over by B.O.A.C. for their staff. "B" is the present airport hotel group, which will shortly be used only by American and other airlines as their quarters. "C" is the site occupied by Newfoundland Government employees. "D" indicates the new reception, hotel and restaurant buildings for airline passengers, and the tarmac which is used by B.O.A.C. The hangars at this position are large enough to take eight Constellations or Skymasters, and in addition to give office space. "E" is the hangar at present used by American Airlines. Their temporary offices are also here, but the hangars are not large enough to take a Constellation.



First built as a base for transatlantic ferry services for delivery of military aircraft, Gander has now become an important link in the North Atlantic airline route. A key to the lettering is given in the text.

Many of the improvements in handling and organization have been the work of Mr. D. O. Bustard, B.O.A.C. station superintendent. Since the temporary cessation of Constellation services, Gander has had a fairly quiet spell, but this will soon be changed as a result of the declaration that Constellations are fundamentally sound. B.O.A.C. expect to resume their services almost immediately and to commence using the new passenger accommodation at Gander.

For the Bookshelf

Pathfinders. By Wing-Commander Bill Anderson, O.B.E., D.F.C., A.F.C. Jarrolds Publishers (London), Ltd. 16s net.

THE author is to be congratulated on an excellent and colourful story of Bomber operations. He has succeeded in capturing the atmosphere, perhaps because of his own almost abnormal sensitiveness to it, of nearly every phase of operational life and at the same time in giving an authentic historical background. This book will appeal to those crewmen who during the war led the sort of life Wing-Commander Anderson describes, and will undoubtedly revive memories of many exciting incidents and fascinating experiences. For those who wish to know what went on in the mind of a typical member of a bomber crew—a family man called up from civilian life—this narrative, told in simple everyday language, will provide a true and appealing record.

If a fault is to be found with this book, "Pathfinders," it is with the title, for while the formation, duties and highlights of Pathfinder Force are recorded with the authority appropriate to one of the first men to work with Air Vice-Marshal Bennett on the formation of this Bomber Command Group, the author devotes the majority of his chapters to less specialized matters, including very many purely personal references to his family life. Rather it is an autobiography of the years he spent in the Royal Air Force with enlargement of the incidents referring to his association with the formation and development of the Pathfinder Squadrons.

Air Vice-Marshal D. C. T. Bennett writes of "Andy" in the forward. "Few are better qualified, for he was in at the beginning of that organization, and contributed a share in gallantry and hard work towards the success of the P.F.F. at least comparable with any other man in it."

World Power and Atomic Energy. By Dr. H. E. Wimperis, C.B., C.B.E. Constable and Co., Ltd., London. 6s net.

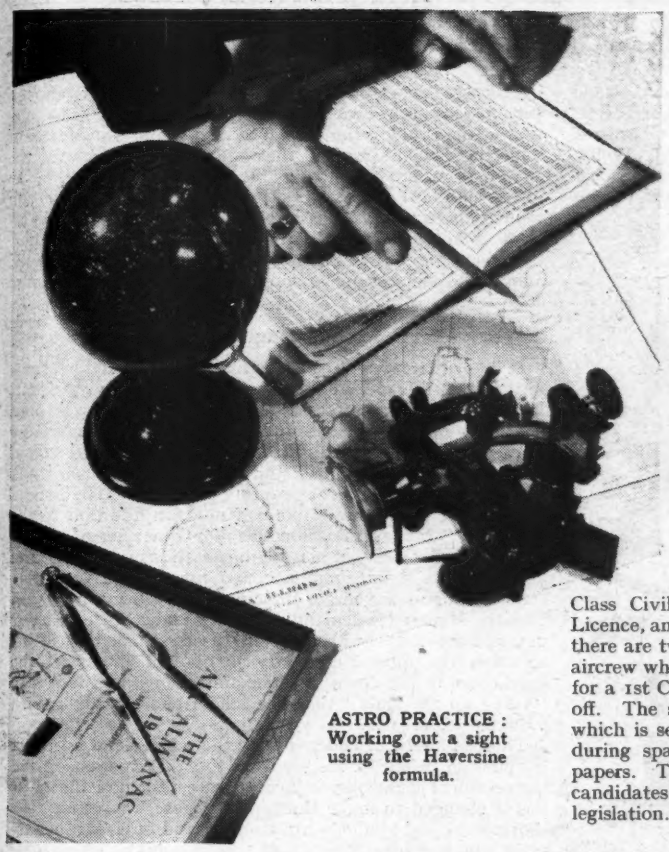
THIS uneasy world is fortunate in possessing a few men capable of elucidating international problems having scientific as well as ethical and political facets. Such a man is Dr. H. E. Wimperis, a past President of the Royal Aeronautical Society and Director of Scientific Research at the Air Ministry from 1925 to 1937. His new work focuses his intellect on the perils attending the introduction of robot weapons and the discovery of atomic power.

Freely admitting to his discussion the views of all who have contributed to our knowledge of, and have stimulated thought on, these new weapons, he discusses their menace in war, the source of atomic energy, the possibilities of development and the need for control.

The comments of Dr. Wimperis on the nature and potentialities of the flying bomb and rocket missile suffer only from a lack of detail information. Could he have drawn more deeply on official material he would doubtless have been less mystified that the Germans "should have chosen such a foolish flying speed for V1 as 300 to 350 m.p.h.; just the speed at which it could comfortably be intercepted by our fastest fighters." He might then have discovered that the speed was not a mere choice and that an increase would have severely prejudiced the ease of construction and operation of the missile.

A Visit to an Aircrew Ground Training Establishment

CIVIL AIR LICENCE SCHOOL



ASTRO PRACTICE : Working out a sight using the Haversine formula.

As release groups came along and the necessity of finding a civilian occupation presented itself, many Service aircrew turned, during the past year, to civil aviation for a career. A civil air licence was in many cases the only barrier to employment, and some hard work went into preparation for the examinations. Not only was the "swatting" laborious, but there was always the feeling that so much of it was unnecessary as well as the additional anxiety caused by having no superior being for solution correction.

There can be little doubt that the quickest and most efficient way of working for an examination is to go to a good specialist school. For the benefit of those readers who are contemplating a career of flying "for hire or reward," some idea of the facilities which are available at one of the London schools may be helpful.

Straight Aviation Training have taken over the basement at Bush House and turned the whole into a series of lecture rooms, equipped with air-conditioning, lighted by sodium tubes and decorated in such a way as to discourage that after-lunch anæsthesia.

The school is organized on a system of courses for the individual licences which start at varying frequencies. "B" licence courses, for instance, last six weeks, but a new one starts every three weeks; First and Second "N" courses last twelve weeks, but a new one is started as an old one finishes. The hours are 09.30 to 17.00 daily, with a well-earned rest on Saturdays and Sundays.

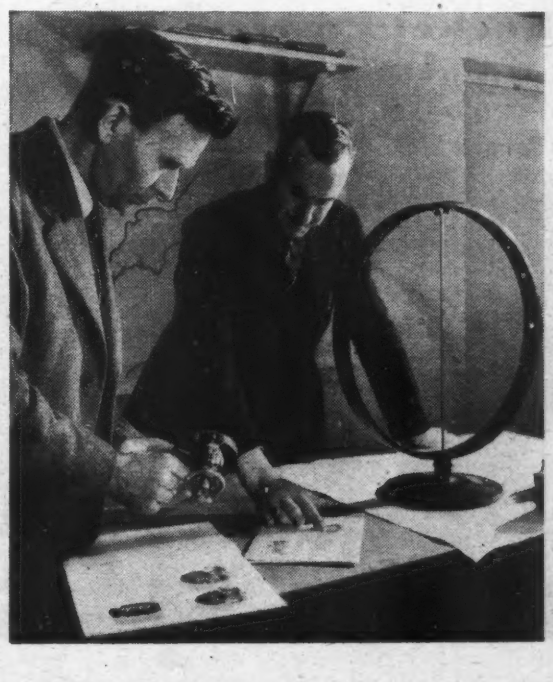
The training consists of lectures, plotting exercises and practical work, using synthetic apparatus. In addition to the normal requirements, the school includes in its equipment a Deviascope for compass swinging, a "mock-up" signalling trainer and a Link. In addition to 1st and 2nd Class Civil Aviation Navigation Licence courses, "B" Licence, and conversion courses for R.A.F. Warrant holders, there are two special ones which are of interest. One is for aircrew who are already in employment and who wish to sit for a 1st Class "N" but are unable to take sufficient time off. The scheme is known as "Study while you work," which is self-explanatory, and embraces individual tuition during spare time, correction of practice plots and test papers. The other is a one week's course for "A" licence candidates, especially useful for those who are shaky on legislation.

GYRO PRECESSION : The gyro is fixed in the holes of the "Meridian" which, when turned, demonstrates precession.

Synthetic Training

There are two Link trainers for the use of pupils requiring instrument-flying practice in order to reach the necessary civil aviation standards, blind-approach practice, or for purely *ab initio* instrument flying.

The School's Director of Training, Group Capt. W. N. Cumming, D.F.C., is a Master Pilot and holds a 1st Class



CIVIL AIR LICENCE SCHOOL

Civil Aviation Navigation Licence. His flying experience covers India, Africa, Canada, Egypt and the Mediterranean, as an Imperial Airways Captain, and many other theatres with the R.A.F. during the last war. Mr. J. T. Wells, the chief instructor, is an Extra Master Mariner, and also holds a 1st "N." The qualifications of the rest of the instructors are impressive, and it is noteworthy, though perhaps natural, owing to the predominance of navigation in the courses, that they are mostly pre-war Merchant "nautics" who served in the R.A.F. during the war, the combination producing valuable experience.

PRACTICAL COMPASS SWING: On the deviascope the permanent magnets may be placed in any of the slots. The vertical and horizontal 50ft iron rods can be seen in the photograph, which shows also the magnetic headings on the compass base.

The standard of specialized knowledge of each student on joining the school is assumed to be low, many having almost completely forgotten their elementary mathematics. Courses consequently start at an elementary level, amounting to revision for most, and rapidly become more comprehensive.

Thinking Fast

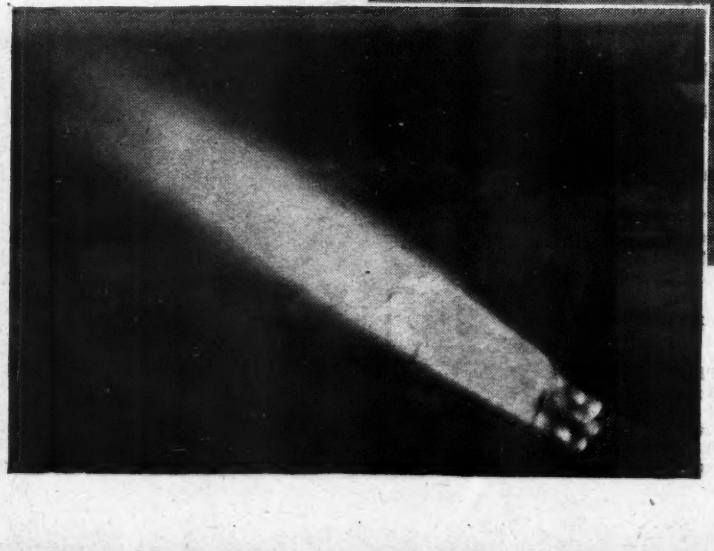
It was interesting to obtain from the instructors some idea of the difficulties experienced by the average student. It may be an unkind thing to say, but the average pilot or navigator has not had to stir his grey matter to any great extent since passing through R.A.F. training, except on rather stereotyped lines, and when called upon to think hard and quickly he is considerably perplexed. High-speed efficiency is even more important now; in addition to the oral, the "B" examination has, for example, a written paper which consists of a string of questions requiring brief answers in a very short time. Group Capt. Cumming stressed this as the major difficulty, there being no doubt that the Ministry is demanding quick and accurate thinkers in civil aircraft. The observation was also made that it was so often the most elementary points which caused the candidates to fall down in the examinations, and it was in "tying up the ends" that the school had already gained valuable experience.

There is an air of endeavour at the school, and an effort is made on behalf of the students to gain experience from the results of each course. Lectures are altered or the syllabus is changed to make the training more interesting, the shortcomings of students are studied, and only bare necessities are taught. This applies especially to legislation, probably the biggest headache of all, and one which can involve so much unnecessary study.

Group Capt. Cumming did mention that accommodation can normally be arranged for pupils requiring it.

Rocket Power in America

6,000lb Static Thrust Claimed for New Unit



SEEN on test in New Jersey is the 1,500-N4C rocket unit developed by Reaction Motors, Inc., of Dover, N.J., for the U.S. Navy. This unit operates on liquid oxygen and alcohol and is rated at a thrust of 6,000lb. These photographs are of particular interest as it is known that one or more American research aircraft will use rocket power. The illustrations show details of the engine and the length of the flame.

The Folkestone Races

HOLIDAYMAKERS at Folkestone and Hythe should have a good view of the races to be organized by the Cinque Ports Flying Club during the last week-end of this month. The heats for the Folkestone Aero Trophy are being run off next Saturday, August 31st, starting at 2.30 p.m., and the organizers ask that any aircraft attending the meeting will endeavour to land by mid-day; other aircraft are asked to keep well away from the circuit during the race. The public will not be admitted to the airfield on Saturday.

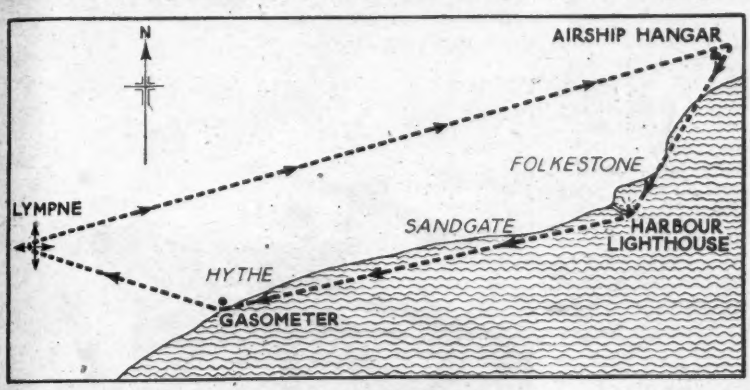
On Sunday, September 1st, the final will start at 3 p.m., and the Lympne High-Speed Handicap race at 4 p.m. Once again, it is requested that visiting aircraft will keep clear of the circuit during the racing, and, if intending to land, to do so well before the racing starts. The public will be admitted free of charge on this day to one end of the airfield only. The club enclosure will be reserved for competitors, members and their guests. Loudspeakers have been installed at the airfield, and a special relay has been organized to the promenade at Folkestone for the benefit of those who will see the aircraft on the seaward leg.

Although the main Lympne event may appear to be new to many, it will be, in fact, the ninth of the series. The last race, over an exactly similar course, was flown in the August prior to the outbreak of war. This 1939 race was won by the Hon. A. W. H. Dalrymple, now unfortunately no longer with us, flying his firm's Train-engined Chilton single-seater, with which he averaged 126 m.p.h. in the final event; the best time of the day was made by Capt. E. W. Percival, with a Mew Gull, at the quite remarkably high average speed of 230 m.p.h. Although this figure will be vastly exceeded in the High-Speed Race, it would not seem, judging from the entry list, that such an average is likely to be repeated this year in the Folkestone Aero Trophy race itself.

ENTRIES* FOR FOLKESTONE TROPHY RACE

Aircraft and Registration	Entrant	Pilot
Miles M.28 (AGVX)	Tommy Rose	Tommy Rose
Vickers Walrus (AHFN)	Whaling Co.	John Grierson
Sokol (OKAHH)	K. J. Drbohlav	K. J. Drbohlav
B.A. Swallow (AELG)	Mr. Godfrey	Paul Godfrey
Percival Q.6 (AFIX)	Air Kruise Ltd.	Ian McLaren
Miles Messenger (AHZS)	Ditto	W/Cdr. Kennard
Taylorcraft (AHAJ)	N. F. Dunkerton	N. F. Dunkerton
Proctor I (AGWV)	J. N. Somers	J. N. Somers
Proctor I (AHFZ)	Trade Wind	Sqn. Ldr. Reston
Hornet Moth (ADKC)	Herts and Essex F.C.	J. K. Seear
Miles Monarch (AFJU)	Miss Betty John	Eric Simmonds
Piper Cub (AFIZ)	Peter Landaur	Peter Landaur
Proctor II (AHNB)	R. Temple-Harris	R. Temple-Harris
Proctor I (AHNV)	Percival Aircraft	D. M. Bay
Tipsy II (AFJT)	D. R. Robertson	D. R. Robertson
Moth Minor (AFOZ)	C. G. Clegg	C. G. Clegg
Tiger Moth (AHNX)	Hunting F.C.	R. Pomfret
P. Gull VI (ADPR)	Ditto	L. T. Carruthers
D.H.82 (AHDD)	Ditto	Peter Fentance
Proctor I (AHEE)	Ditto	J. F. Arnold
Auster V (AHAX)	G. W. Derbyshire	G. W. Derbyshire

* At the time of going to press.



The certain starters for the High Speed Trophy Race—as far as anything aeronautical can be "certain"—number only four at the time of going to press. These are as follows:

Aircraft	Racing Number	Pilot
Vampire I	1	Geoffrey de Havilland
Hornet I	2	Geoffrey Pike.
Fury I	4	Bill Humble.
Seafang	5	Guy Morgan.

Cloud Warning by Radar

A British Scheme to Reduce Flying Hazards

THE first British aircraft to be fitted with special radar apparatus for the long-range detection of bad weather has returned to England from South-East Asia, after a series of experimental flights, the results of which are of far-reaching importance towards the attainment of safer flying.

The aircraft, a Lancaster bomber, was sent out by the Telecommunications Research Establishment of the Ministry of Supply and Aircraft Production, whose scientists have been responsible for the development of radar in Britain. Accompanying the Lancaster's crew of operationally experienced fliers was a team of four scientific observers and R.A.F. meteorological experts and a sergeant photographer.

South-East Asia was selected as rendezvous for the trials because of its hazardous weather conditions, and also because facilities for obtaining meteorological information are fewer than in Britain. The experimental aircraft was based at R.A.F. Station, Changi, Singapore, and over the period of a month observation flights were made in all kinds of weather.

The type of equipment required for cloud and collision warning differs from that used in wartime to "pin-point" land objects or ships at sea, when it was necessary to "see" as large an area as possible by radar. This was achieved by using a searchlight radar beam producing a maplike picture —which could extend to a radius of a hundred miles round the aircraft—on the cathode-ray tube. For weather detection, a smaller area in front of and at the same height as the aircraft, requires observation.

In the test Lancaster, the aerial system was built in a dome replacing the normal mid-upper turret, and in transport aircraft it will probably be carried in the nose of the machine. The indicator on which the cloud or high ground shows up as a bright spot will be placed close to the navigator's seat.

Heavy clouds, rain squalls and storm centres reflect the radar beam, often from a great distance. Clouds return the beam because they contain water particles, and the greater the degree of moisture the stronger the returning echoes. Thus it is possible to measure the density of cloud formations, and the pilot can be given ample notice to take avoiding action.

During the recent experiments much time was spent in "cloud chasing." After take-off from Changi airfield, the Lancaster climbed to some 10,000 feet, from which height clouds could be seen with the naked eye a great distance away. The "Met" flight lieutenant would compare his own observations with the appearance of the clouds on the radar indicator. Photographs were taken simultaneously of cloud formations and of radar showings.

Many important data were collected during these trials, which will enable the Research Establishment in England to modify and improve radar equipment. In its present form the apparatus is too unwieldy for general use in transport aircraft, where every additional pound of weight has to be carefully considered. The experiments will be continued shortly in a York aircraft fitted with much more compact and simple apparatus.

The vital importance of short pulse radio waves in the detection not only of dangerous clouds but in giving warning of high ground and hills, is obvious. Airborne radar for night flying, and for use during monsoon weather in the Far East, will greatly reduce the hazards of air travel.

LE ZOUTE RALLY

A Week-end on the Continent as Guests of the Air Union Belge

Illustrated by "Flight" photographs

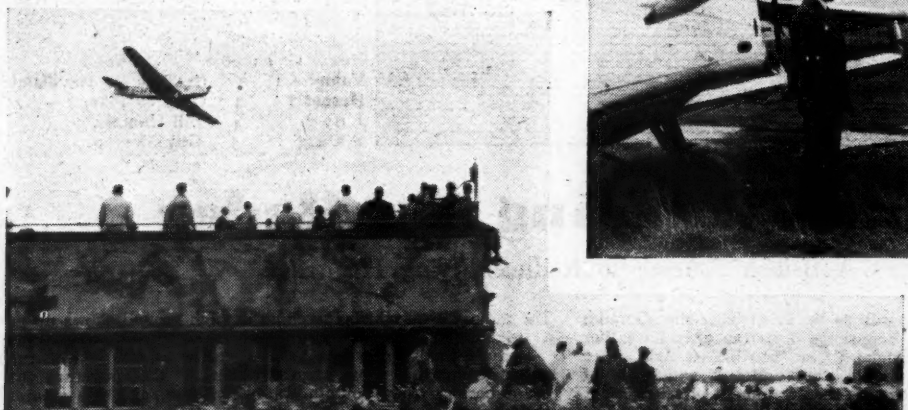
THERE are many differences between local air meetings arranged on the Continent and those which take place over here. Some of the differences have always existed, others are the result of present-day conditions. In the former category, British events are characterized by the organized "visitors behind the barriers" attitude, the attempt to keep to a timed programme, the regular attendance of the familiar nucleus of enthusiasts, and the calculated air of limited visible enthusiasm. By contrast, a foreign meeting is supported by most of the local populace, there is much civic and religious ceremony, almost complete disregard of time, great excitement, and a rather terrifying lack of airfield or circuit control.

Le Zoute is a pleasant, small holiday resort on the north Belgian coast near the Dutch border. The airfield is quite large, and both grass and steel-mesh runways are safe for light aircraft. Customs can be arranged locally, and almost everyone connected with the airport speaks at least some English.

Two members of *Flight* staff flew over in a Moth Minor to the week-end rally arranged at Le Zoute on August 17th and 18th. Together with a small British contingent they were most hospitably entertained, accommodation, food, parties, transport and unlimited free petrol all being provided by the organizers, the Air Union Belge.

Intermittent bad weather reduced attendance, but everyone seemed to have an enjoyable week-end. Last of the visitors to arrive were the two Danish KZ-IIIs flown respectively by Mr. F. Drescher and Mr. L. Olsen (C.F.I. of the Danish Aero Club), and a British Rapide flown by Wing Cdr. Holmes of Stewart Smith and Co.

After an opening ceremony during which all aircraft were blessed with holy water, there was a fly-past



(Above) Major Duncan-Smith stands in front of his smart Hornet Moth during the blessing ceremony. (Left) The Moth Minor, here seen during a demonstration, was admired by all.

Hosts and guests seen in the above photographs are (left to right) Mrs. Wuytz, Mrs. W. P. Bowles, Mrs. Van der Veken, Mrs. Barrett, Mr. Wuytz, and Mr. P. A. Shaborel (both of Intava), and Mr. Maurice Smith of *Flight*.

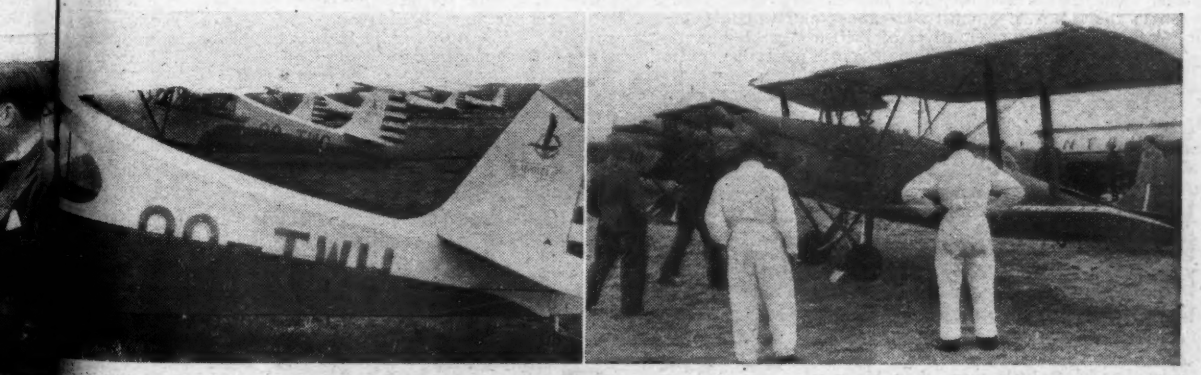
(Above) The scene at Le Zoute airport before the opening ceremony. (Below) Mr. Van der Veken, organizer for the Air Union Belge of the Le Zoute Rally, seen in a Norseman.

of visiting aircraft. Austers, Piper Cubs and Tiger Moths of the Belgian Royal Air Force and the Le Zoute Flying Club each gave displays, and British visitors flying Hornet Moths (Mr. Bowles and Mr. Duncan-Smith), a Proctor (Mr. Somers), demonstrated their aircraft.

Among those who entertained the visitors at the Rally were a number of officers and ex-members of the Belgian Royal Air Force. By coincidence, Mr. Somers, who served as a flying instructor during the war, met one of his old pupils. Belgian officers have retained their wartime R.A.F. style uniforms, the shoulder flashes indicating nationality. Mr. Van der Veken, who was largely responsible for the Le Zoute Rally, escaped with his mother and three young men from occupied Belgium in 1941, and succeeded in crossing the Channel in a rowing boat. He joined the Royal Air Force in England.

For English visitors Belgium is expensive, but almost everything is obtainable, and two prices are quoted for rationed foods, clothing, etc., one with and one without coupons. The exchange is 175 francs to the £1, and as an indication of prices, eggs may be bought for about 5 frs each, a dry Martini at the bar for 60 frs and nylon stockings for about 300 frs per pair.

It is certain that a letter to the Air Union Belge would assure British pilots of all assistance and advice if a visit to Belgium is contemplated, and Le Zoute has many features to commend it as a choice. The flight up the coast from Calais is interesting and raises no navigational problems, and while providing a complete change of scene and atmosphere the distance from England places the Belgian coast within range for even a one-day visit.



Among the local aircraft demonstrated were Aeroncas of the Le Zoute Flying Club (left) and Tiger Moths of the Belgian Royal Air Force (right). Flown by instructors, the Tigers gave a good display of formation flying and individual aerobatics.

Radar for World Airlines : Caribbean Organization : New Zealand Nationalization

CIVIL AVIATION NEWS

RADAR FOR WORLD AIRLINES

P.I.C.A.O. have requested the British and U.S. Governments to place at the disposal of the world's airlines the developments in radar which resulted from the war, in so far as they can be applied to the advantage of civil aviation. *Flight* has urged recently a greater utilization of the military developments of radar, and the P.I.C.A.O. request is indeed a welcome indication.

The British Ministry of Civil Aviation are arranging, with the co-operation of the R.A.F., a demonstration of our radar navigational aids and approach systems at Bassingbourne, R.A.E. Farnborough and T.R.E. Malvern, between September 9th and September 30th, to which representatives from the Government members of P.I.C.A.O. will be invited. Discussions in this country will follow the demonstration and the delegates will then witness demonstrations of American equipment in the United States.

U.S. TO USE ASCENSION ISLAND

THE small British colony, Ascension Island, about mid-Atlantic and eight degrees south of the Equator, is to be used by Pan American World Airways as a stepping stone between Natal and Leopoldville on one of their two new routes from New York to South Africa. The other route is via the Azores and Dakar to Leopoldville and south to Johannesburg and Cape Town. This represents another link between the U.K. and South Africa as Panair do Brazil already run a weekly service from London to Dakar. The regular service will start as soon as all landing arrangements have been completed.

CARIBBEAN NAVIGATIONAL AIDS

A REGIONAL Conference of P.I.C.A.O., convened by the U.S., started discussions this week in Washington on the subject of air navigation aids for the Caribbean region.

Invitations have been extended to all Governments whose national aircraft operate in the Caribbean zone, which is defined by P.I.C.A.O. as the seaboards of the Gulf of Mexico and Caribbean, territories in Central America, the Bahamas and West Indies, countries of South America north of the Amazon, and including Ecuador, and the intervening water areas. The British delegation left London Airport on August 22nd in the B.S.A.A. aircraft *Star Land*, and will be joined in Washington by representatives of British West Indies.

There has recently been some confusion in air traffic control and certain ancillary services, due to changes in the military organizations in the area occasioned by the reversion from war to peace conditions, and it is the intention of the conference to standardize procedures, stimulate the provision or improvement of ground facilities, communications and meteorological services.

It is understood that the International Meteorological Organization, the International Telecommunications Union, the International Air Transport Association and the Federation Aeronautique Internationale, will be participating in the conference, which should go a long way towards the development of air transportation in the Caribbean area.

NATIONALIZATION IN NEW ZEALAND

THE post-war organization for New Zealand airways is now taking shape. The plans for nationalization differ from those of the United Kingdom in that only the internal air services are to be New Zealand-owned. This involves the acquisition of the premier airways organization, Union Airways, and the creation of the New Zealand National Airways Corporation.

The transfer of control from the present operators is taking place gradually. The R.N.Z.A.F. No. 42 Transport Squadron is disbanding and its present daily week-day Wellington-New Plymouth-Auckland and return service for civilians and mail is ending. Lockheed Electra aircraft will be used by the Corporation on a daily return service between Auckland, New Plymouth, Palmerston North, and Wellington, and connecting with the South Island services. Additional Cook Straits runs between Wellington and Blenheim will also be made.

Tasman Empire Airways will not come under the New Zealand nationalization plan and it is understood that the frequency of the T.E.A. Auckland-Sydney service is steadily increasing. It will be remembered that this company recently took delivery of two Sandringham flying-boats, with a third still due. The new flying-boats will carry more passengers and are expected to average faster times.

NEW ROUTES

TWO new schedules are announced by the Corporations. B.O.A.C. started the Dragon route to Hong-Kong on August 24th with Hythe flying-boats at a frequency of one service per week, to be increased later as more aircraft are available. B.S.A.A.C. will fly on Monday, September 2nd, the first of a twice-monthly service to Central America. Calls are

CROYDON TO-DAY : In spite of the fact that London's one-time terminal is now considered to be of little more than historical interest, Croydon has so far been carrying the bulk of the charter and European traffic.

CIVIL AVIATION NEWS

to be made at the Azores (Santa Maria), Bermuda and Jamaica, and at present the service goes only as far as Caracas, Venezuela, leaving England on Monday and arriving on Thursday. The route will be extended to the West Coast when more Yorks and some Tudors are delivered.

It is understood that the Corporation will not take delivery of any more Lancastrians. On the South American run, for the convenience of passengers at Rio de Janeiro, where the airport is on an island, the Corporation have purchased a motor cruiser which was originally designed as a hospital tender for the Pacific theatre of the war, and this will be used between the airport and the main harbour, so that there will be no dependence on local hire facilities.

HONG KONG AIRPORT

THE Hong Kong Colonial Secretary has stated that plans have been drawn up to build a modern airport for Hong Kong costing between £3 million and £4 million. A possible site has been found within the boundaries of the Colony. It now remains for approval from London, and the necessary financial arrangements to be made before work begins on the construction of this airfield, which is designed to make Hong Kong a focal point of international civil airways.

TROPICAL TEST

BY way of demonstrating the aircraft and of checking its performance under tropical conditions, a Bristol Wayfarer has recently been flown to Cairo and back. This aircraft had been delivered in the ordinary way to Airwork, and was flown on the trip by Wing Cdr. B. A. Davy, of this company. The route taken in each direction was via Lyons, Elmes (Sardinia), Malta, Misurata and Benina. On the outward journey the Wayfarer took a Cheetah engine to an aircraft which had been grounded at Misurata, and also delivered spares at various points over the route. The flying time for the trip totalled about forty hours. Included in the flying programme were night flights over Cairo, and among those who watched the various demonstrations were Col. Ryan, of the S.B.A.C., Mr. Pefanis, secretary of I.A.T.A., and Wing Cdr. Rayner, who is assistant to the Air Attaché at Cairo.

IRKSOME TRAVEL

FIFTY countries have been invited to send delegates from tourist organizations to a conference of the Travel Association of Great Britain and Ireland, to be held in London during the first week of October. The principal item for discussion is "the removal of existing restrictions and regulations which make present-day travelling a difficult and irksome business." British European Airways have stated that they are in complete sympathy with the objects of this conference.

LONGER RANGE CONSTELLATIONS

THE Constellations in service with some of the principal airlines, and the subject of so much recent discussion, are, in fact, the Model 49, of which sixty-eight have been built. An improved model, now in production and to be known as the 649, is due for delivery during the autumn and will go into service first with Trans World Airlines and then Air France and Eastern Airlines.

Early next year should see the introduction of the Model 749 which will incorporate a thermal de-icing system, an additional thousand-gallon fuel capacity, and what is described as "the long-range wing." Both the 649 and 749 are to be fitted with Wright Cyclone engines with increased power, giving 2,500 h.p. for take-off and, at cruising figures, an airspeed of approximately 310 m.p.h.—an improvement of about 50 m.p.h. on the current models.

The higher performance will enable Trans World Airlines to run faster coast-to-coast services; the eastbound journey should be accomplished non-stop within eight hours, but, while the fuel capacity will permit the necessary range in the westbound direction, the current flying-time limitation for pilots, unless modified, may compel a stop for crew change.

The first Constellation to resume a passenger-carrying scheduled service since the modifications were completed was the Pan American *Bermuda*, which arrived at London Airport from New York last Sunday. All Constellation services should be running again in a short time.

FROM THE CLUBS

The Edinburgh Flying Club will be formally re-opened next Saturday at 3.30 p.m. by the Right Hon. Sir John I. Falconer, Lord Provost of the City of Edinburgh. As in pre-war years, the club will be operating from Macmerry airfield, which is about eleven miles due east of the centre of Edinburgh and on the north side of the Great North Road.

Although easily found by air, Macmerry has suffered ploughing attentions during the last six months, and only part of the original field is now usable. This part, for the benefit of arrivals by air, is at the western end of the area, though there is, in addition to the 730-yard east-west grass run, a grass and wire extension runway for emergency use. The north-south run is 700 yards, and the hangars, clubhouse and windsock are on the south boundary.

All the clubs are being invited to the opening, and visiting aircraft are also being asked to take part in various competitions. There will be a public enclosure and car park facilities.

* * *

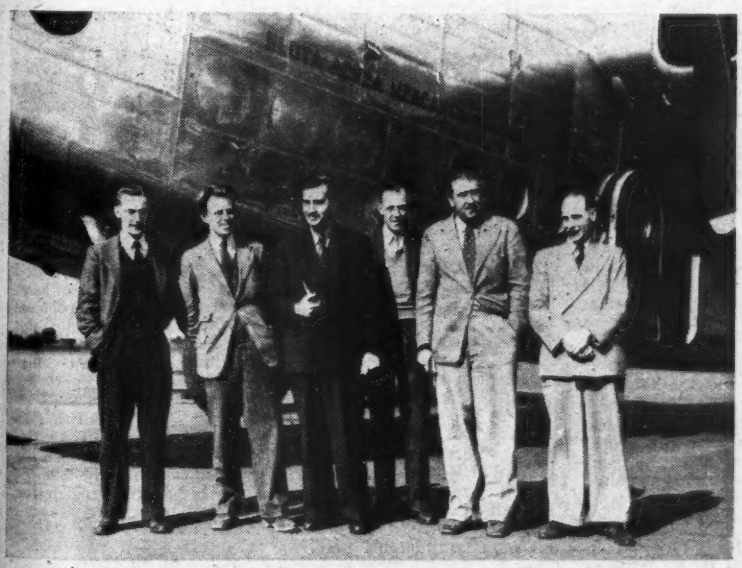
With a membership of more than sixty and with the increased number of hours now being flown, the United Services Flying Club at Elstree has been able to reduce its flying charges. These now stand at £3 15s an hour. Part of the clubhouse is now open and limited meal facilities are available.

* * *

A flying club is shortly to be opened in the Channel Islands as a subsidiary to Island Air Charters, Ltd. Its flying headquarters will be at St. Helier, and it will be known as the Jersey Flying Club. A Tiger Moth and an Auster will be used, for which the rates for dual and solo will be £3 an hour except during the week-end, when the figure will be increased to £3 10s. The club hopes to hold a rally on September 8th in connection with the local Battle of Britain Week, and both private owners and club members are being invited. The address of the secretary of the club is 22, Broad Street, St. Helier, Jersey.

* * *

The Royal Aero Club of Denmark has extended an invitation to our own Royal Aero Club to participate in a "Danish Flying Day" which will be held on Sunday, September 22nd. Pilots taking part will be the guests of the Hillerød, Odense, Esbjerg and Aalborg Clubs between September 20th and September 23rd, and those who hope to attend are asked to send their names and aircraft details to the R.Ae.C. as soon as possible.



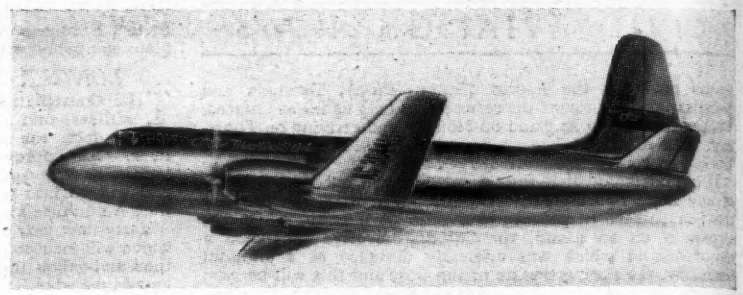
ARGENTINE YORK: The crew for the second Avro York ordered by Flota Aerea Mercante Argentina, with the company's chief pilot, Capt. N. S. Fortin (with pipe) in the centre. Second from the right is Capt. R. S. Hinks, who flew the aircraft on its delivery flight from Woodford.

CIVIL AVIATION NEWS

B.E.A.C. SPARES POSITION

BRITISH EUROPEAN AIRWAYS have accumulated at White Waltham great quantities of spares in preparation for the Continental Viking services. This reserve has been built up well ahead of aircraft deliveries, and the Corporation is already in the gratifying position of being able to maintain thirty-five Vikings on the routes. All Continental airports to be used by B.E.A. Vikings will be equipped with the necessary spares and maintenance equipment. This will be backed for emergency purposes by two Bristol Freighters which are being rigged out as flying workshops.

Maintenance is the lifeline of an air service, and that, in turn, must be supported by an efficient stores organization—a difficult and complicated task when there is a great network of routes to cover. Handling equipment and spares are also being accumulated at White Waltham for the Bristol Freighter and Wayfarer which are to be used on the internal services.



TURBINE-POWERED: The Martin 3-0-4 transport, developed from the 2-0-2 and 3-0-3, will differ from these types in having turbine-airscrew units of unspecified type. Orders have been placed for 132 of the 2-0-2 type and 159 of the 3-0-3.

WORLD TRADE CONVOYS

AT various times during the past decade or more schemes have been devised, and even carried out, whereby mobile exhibitions have been organized so that British goods could be shown in foreign parts. The idea of such mobile exhibitions is, therefore, by no means new, but a scheme which should prove to be more practical and thorough than any previously considered is now being planned by Trade Expeditions, Ltd. Although the aircraft trade is only now being seriously approached, the arrangements which are being made should be of some interest to those firms which are able, now or in the future, to export aircraft and parts.

The organization known as Trade Expeditions was originally started as long ago as 1931, and the first of some forty-odd subsidiaries—Trade Expeditions (England), Ltd.—has recently been formed. This subsidiary is planning to run a series of exhibitions in South America, the exhibits, films and other equipment being carried in a motor convoy which will be on the road in Brazil, Chile, Uruguay, and the Argentine during the coming two years. The next two subsidiaries to be formed will be for Canada and Australia.

The primary idea is to prepare the markets for future sales, when the various industries are capable of offering maximum and more immediate deliveries. Exhibition space need be rented only month by month by firms, and, so that there will be no monetary difficulties, a system of private barter is to be developed through the network of subsidiary companies. For example, if a Brazilian requires certain British goods, these will be bought in this country, delivered to Brazil, and the payment will be made in, say, coffee, which will duly be sold by other subsidiaries in other countries. It should be stressed, however, that definite sales are not the immediate object of the expeditions, the purpose of which is to show the commercial flag. Where local firms' agents are available, they will be asked to take a front place in the picture and to handle demonstrations and sales.

CIVIL CONTROL

SOME general information covering the civil air traffic control service appears in *Notice to Airmen No. 120*. Apparently the system will, in the main, follow the well-known and set Service procedure. For the benefit of those who may not see this *Notice*, the daytime standardized lamp signals are the same—with an intermittent green light giving permission to taxi; a steady green light giving permission to take off, or to land; an intermittent red giving instruction to move clear of the runway or, to an aircraft in the air, notification that the airfield is unfit for landing; and, finally, a steady red light or red Very light indicating the prohibition of all movements on the landing area, or a temporary prohibition of landing.

There are now twenty-three air traffic control stations available for the assistance of civil aircraft. The position of the control office on an airfield is indicated by a diamond-shaped board showing a black "C" on a yellow background. Visual signals will be given from the control tower, from the conventional chequered airfield control van, or by means of ground panels displayed in the signals area.

BREVITIES

The B.E.A. Viking *Vagrant* completed a proving flight on August 20th from London to Oslo, calling at Stavanger. On September 1st a Viking service to Copenhagen will be opened with a frequency of four a week, and on the following day the Stavanger-Oslo route will be opened with three services a week, and the Amsterdam route with twelve a week. This replaces the present Dakota service of the same frequency.

* * *

Quite a few years ago "Indicator" stressed the importance of dealing with the "last lap" of air travel—from the airfield to the doorstep—and suggested that a hire-and-drive-yourself car system might be organized at all the major airfields. Something on rather similar lines has recently been started by Airfields Autohire, who are now operating cars from Northolt and Heathrow. The company's head office is at 39, St. James' Street, London, S.W.1. (Mayfair 6656).

* * *

An Air Transport Agreement has recently been signed by the United States and the Lebanon, giving Pan American World Airways the right to make traffic stops at Beirut on the Company's India run. In the usual way, Lebanese Airlines have been given similar rights in the United States.

* * *

Pending the appointment of a Civil Air Attaché in Washington at the end of this year, Air Vice-Marshal R. P. Willock, C.B., has been invited to hold the post, which was recently relinquished by Mr. Peter Masefield, who has become head of the recently instituted Long Range Planning Division of the Ministry of Civil Aviation. Air Vice-Marshal Willock has been deputy head of the R.A.F. delegation, and has been attached to the Combined Chief of Staffs in Washington.

* * *

The Ministry of Civil Aviation has shown initiative by distributing to members of their staff copies of the official publication *Merchant Seamen*. It will be a step in the education of chairborne administrators in the trials and tribulations of operating aircraft, creating an interest and understanding which is so often missing in large organizations.

* * *

Seven Boeing Stratocruisers have been ordered by United Airlines. These will be delivered during the autumn of next year and complete a total of forty-nine of this type which have so far been ordered. Apart from the American companies P.A.W.A., Northwest, American Overseas and United, one "outside" company, Swedish Inter-Continental Airlines, has so far placed an order for this type.

* * *

Since the appointment of Cdr. G. O. Waters, O.B.E., as manager of the English Division of B.E.A.C., Cdr. J. M. Keene-Miller, O.B.E., is now acting as general manager for Channel Islands Airways. Cdr. Keene-Miller joined the original Jersey Airways in March, 1934, and has latterly been acting as staff pilot to the company. This last post has now been taken by Capt. E. W. Jordan, who has also been with Jerseys for some considerable time.

* * *

Charter flying from the Channel Islands is now being undertaken by a company which has recently been formed in Jersey. This is Island Air Charters, Ltd., the managing director of which is Mr. R. J. Martin. The fleet at the moment consists of three Percival Proctors and one D.H. Rapide.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

FLYING OYSTERS
A Pre-war Service Recalled

WITH reference to above in *Flight*, June 13th, it may interest you to know that oysters were flown weekly, and sometimes twice weekly, from Sydney to Singapore for several years before the war. They were for local consumption.

Sepang. ANTHONY DENNY.

COANDA EFFECT
For Scavenging Two-stroke Engines

MAY I suggest another use for the "Coanda Effect" described in *Flight*, August 15th? The idea is to use the "effect" for scavenging two-stroke aircraft engines. In the case of an air-cooled engine, some of the cooling air would be diverted into a jacket surrounding a section of the exhaust pipe, and from there would enter the exhaust pipe through a slot of suitable dimensions and would produce a venturi effect (as in the Coanda nozzle described in your article) that should suck most if not all of the exhaust gases from the cylinders and thus do away with the necessity of providing a scavenge blower. The internal diameter of the exhaust pipe would need to be between 80 mm and 200 mm—not a serious difficulty.

In the case of a liquid-cooled engine, a blower would be needed, but it could be somewhat smaller than the ordinary scavenge blower.

It seems to me that this engine would go a long way towards providing the engine with a fuel consumption of less than 0.35 lb/b.h.p. per hour that Air Commodore F. R. Banks asked for in his paper, "Power Units for Future Aircraft," published in *Flight*, April 11th, especially if it is designed to use heavy oil.

No doubt there is some snag in the idea, but I should like your readers' views. A. M. H. DUNN.

"MATELOT ERKS" TOO
On Carriers and in the Desert

IN order to complete your correspondence thanking "Joe Erk" (*Flight*, July 25th and August 8th), may I on behalf of all the naval pilots thank those "matelot erks" for a similar difficult job so admirably performed on H.M. carriers and Naval air stations?

Whether it was the squadrons in the desert (still unsung and at one time a respectable percentage of the Desert Air Force) or those on carriers in northern waters, "Jack Erk" never failed to come up to scratch when required.

Although the conditions under which he worked were sometimes reasonable, at other times they must have been hell. Those pilots who have manhandled and picketed aircraft on an icy flight deck or in sweltering tropical heat had a minute insight of his everyday life, but in spite of plenty of grumbling often increased by inadequate shore leave for no apparent reason, the spare aircraft was "always on the lift when required" (assuming the drivers of the previous flight had not favoured the eighth or ninth wire!).

My individual thanks to my old erks, wherever you are, of 803, 806 and 885 Squadrons.

D. S. PAPWORTH (ex-Lt. (A.) R.N.V.R.).

AIRCRAFT DISPOSAL SALES
Clubs Not Getting a Fair Deal

THE members of this club, now numbering over 100 and all keen pilots, view with dismay the Ministry sales of aircraft; we have tendered in four of the disposal sales, and, as before, again we are unlucky.

We do not doubt that there are many genuine owner-pilots and other clubs that need aircraft as badly as we do, but it does seem to us that most of these aircraft are going to the "combines" rather than the clubs.

One can look in the sales column of any aeronautical magazine to find Tiger Moths and the like offered for sale at prices from £806 to £925 each. There seems to be no doubt at all that these must be the same aircraft that are offered in the sales at which, as you are aware, the Ministry does not bind itself to accept the highest or lowest or in fact any tender. What chance then have we, the "poor" clubs, got? We tender in the sales with no luck, and will be forced either to disband or greatly increase charges to get our members airborne.

We do not expect the Government to give us much, but we do expect a fair deal and the opportunity to get cracking; we can do the rest.

It is time that the system used in these aircraft disposal sales was altered. Let them fix the prices first, then we shall know if we have a chance to compete. There is no control of aircraft prices, but the price being asked for reconditioned "Tigers" seems to us to be excessive, because most of these aircraft have had thousands of hours' flying under all conditions with the R.A.F. L. ANDREWS

Gloucester Flying Club. (Hon. Organizer).

THE XB-43
More Evidence of Adaptation

LEST Mr. Christopher Clarkson remain unconvinced by the reply to his letter concerning the Douglas XB-43 jet bomber (*Flight*, August 8th), let him turn to page 109 of the American journal *Aviation* for July. This states quite definitely that the aircraft is a modification of the XB-42 *Mixmaster*. A. W.

COST OF FLYING
Estimate Based on 150 Hours per Annum

YOUR correspondent "J. H. R.'s" letter (*Flight*, August 8th) enquiring for figures of the cost of operating "light aircraft" has, I feel, raised a question which is difficult to answer with any degree of accuracy in view of present circumstances surrounding civil aviation.

As a guide, however, the following figures—based on pre-war operating, but with the post-war "plus-ups" on everything buyable taken into consideration—gives an approximation from which your correspondent may be able to work out the ha'pence.

For the average light aircraft up to 2,000 lb a.u.w. used by the average private owner averaging 150 flying hours per annum (Oh, yes! that was the average flying time for P.Os. pre-1939), I estimate the average costs as follows:—

Hangarage: Private lock-up or open hangar, say	£50 0s
Maintenance: 25 hr and/or quarterly schedule inspections plus wear and tear replacements and adjustments	£75 0s
Fuel: Consumption at average of 7 gal per hr at 2s per gal	£105 0s
Oil: Consumption at average 2 pints per hr plus changes at every 50 hr at average 5s per gal	£12 0s
C. of A. Renewal: M. of C.A. fee	£5 5s
C. of A.: Overhaul cost	£30 0s
Engine Overhaul: Average yearly portion of cost for complete overhaul (assuming complete at 600 hr at average cost of £40) less replacements	£10 0s
Insurance: Comprehensive and third-party cover, average 6 per cent of value (for aircraft value £1,000)	£60 0s
Total	£347 5s

Depreciation, not included above, is dependent on the second-hand market value of the type after, say, five years' operating (always providing the same aircraft is still intact with a current C. of A.), and might by that time have no market value whatever, and therefore depreciation must be at 20 per cent of its original value. For a £1,000 aircraft at this rate of depreciation a figure of £200 should be added to the cost of operating.

The above figures are estimated costs only, bearing in mind the lighter and cheaper types, but if one considers the heavier of the "light types" of approximately 3,000 lb a.u.w. with a higher powered engine of 2/300 h.p., obviously the costs will be much more for fuel, oil, insurance and, again, depreciation.

Hangarage is also a nebulous cost at the moment, but pre-war it ranged from £30 to £75 per annum dependent upon station, whether sheltered in open hangar amongst other aircraft, or in private "lock-up"—the latter being the most expensive as a rule.

Doubtless there will be other figures of costs put forward, and I quite expect there will be adverse comments made upon the figures shown, but, as I see it, one must take into account these items, and to say that the average annual cost of running a light aircraft is between £5/600 is not very far short of actual figures. Landing fees, according to the new scale (if State-owned airfields are to be used), of course must be added.

E. D. AYRE.

The Piston Engine

Some Suggestions for its Further Development Within a Limited Power Range : "Halving" Existing Radial and In-line Types

By C. D. SOLTZ

THE aircraft industry is at an extremely interesting point in its career, brought about by the new developments in power-unit design. The jet-propulsion engine in its many variations has already opened up immeasurable future possibilities of flying and has inevitably brought in its train a series of problems yet to be overcome before its true worth is fully revealed.

In this article it is not proposed to indulge in speculations concerning futuristic designs but to loiter somewhat in the realms of the poor obsolescent piston engine which still, I believe, has a future, however constricted it may be. Too much work has been put into this engine for it to be lightly discarded, and perhaps one of the main advantages of the new jet propulsion and turbine-airscrew power units, namely their *relative* ease of development, may allow a certain proportion of our research and development resources to be concentrated on our first pet whilst still maintaining an economically consistent development staff.

It is assumed, maybe erroneously—the writer is merely expressing his personal opinion—that the field of the piston engine for all practical purposes will be limited to 1,500 h.p. as an absolute maximum and to an altitude of 10,000ft. Above that power and altitude the athodyd, the jet-propulsion engine and the turbine-airscrew will be masters of all they survey. But up to this power it would seem, at the moment, to be economically desirable to utilize our existing knowledge of the habits of the piston engine and not to spend time and labour on attempting the production of other forms of prime mover.

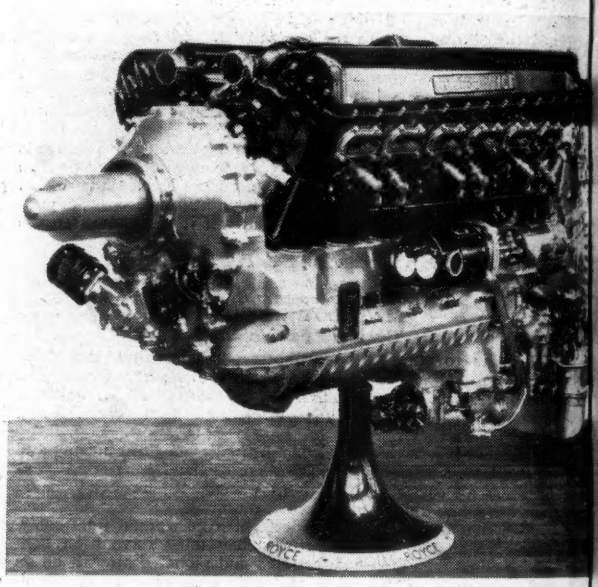
If this view is accepted, the piston-engine designer is confronted with a narrow but extremely interesting field of research in which he should be able with, say, one-tenth of his present resources to increase considerably the efficiency of his engine.

A Wartime Handicap

The development history of the piston engine for most designs usually shows an increase in weight/power ratio above the 1,000 h.p. mark. This is surely not inevitable but merely due to the fact that the majority of aircraft-engine designers were caught at the outbreak of the war with a production engine of 1,000 h.p., and in the war years their main energies were concentrated on producing more horse power rather than in fining and paring existing designs down to better weight limits. The impetus that the war years have given to engine and material development will, without any doubt, have shown us how to do it, and it should be possible now, with all our wartime experience, to lay down the design and development programme of a successful piston engine of 1,000 to 1,500 h.p. with a weight/power ratio of, say, 0.7 lb/h.p. The following suggestions on the lines of research and development for a 1,000-1,500 h.p. engine of this weight/power ratio are offered, always assuming that only a small proportion of our labour resources can be devoted to this field. Some of the lines are naturally applicable to designs of lower horse power.

It is always assumed in the design of a high-efficiency engine that the power developed is raised to the limit of the anti-knock rating of the fuel. Although the war was really fought on 100 octane fuel (100/130 grade) much development work has gone on, and fuels at least 25 per cent better (130/160 grade) are immediately available. The cost of such fuel is usually not intrinsic but merely a question of potential demand. Increasing the fuel quality immediately allows (always assuming that engine reliability can be maintained) an increase in compression ratio and/or boost pressure, with consequent increase in power from a given cubic capacity and thermal efficiency, the last being the main virtue which the piston engine still possesses. Six years of wartime development should allow this to take place without the previous proportionate increase in weight.

If one surveys the materials necessary for the high-efficiency piston engine, the one which has progressed least, and perhaps for that reason alone should have inherent major possibilities, is the lubricating oil. Within the last few years slight developments have taken place in the use of additives, mainly of detergent qualities, which have shown considerable promise in the fields of ring-gumming and sludging, and in automotive design the E.P. range of lubricants for hypoid axle designs are established.



The Merlin has shown how extra power can be obtained from a given engine size by development. A "half Merlin" is suggested for further improvement.

Such developments should continue to be pursued actively by the engine and oil companies, but the main line of lubrication development should be intensive collaboration with the metallurgist to produce chemically reactive and adsorbent surfaces, a field of research relatively neglected but one which should be exploited not only for its bearing on aviation problems—and this piston engine must have a long life—but for its importance in connection with practically every mechanism which needs a lubricant. I am not against the theorists of fluid lubrication, but let them not be too one-sided on this matter, and let us have a little boundary lubrication too if it helps the engine designer and can be satisfactorily handled.

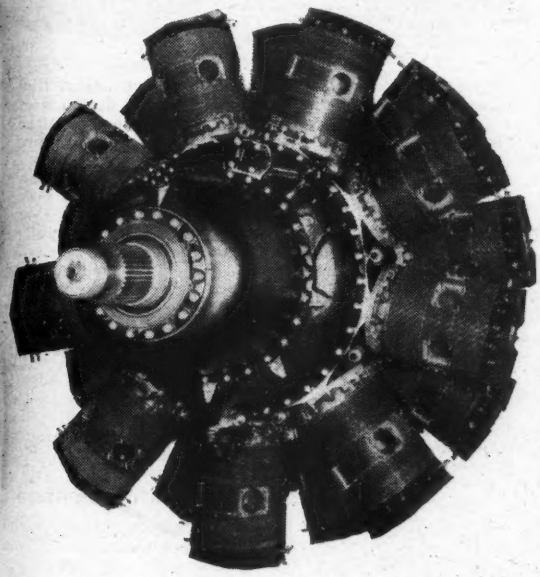
The fuel and oil development sides have been mentioned first, not because they are the most important but first, because the combustion of the fuel is what forces the piston down and the airscrew round; secondly, because the fuel has already been partially developed to the required standard; and thirdly, because the resources of the oil companies, hitherto fully utilized, may find themselves

comparatively neglected for the next few years in relation to the new prime movers. Consequently any work they can undertake on piston-engine problems can be immediately reflected in the labour quantity set aside by the big engine manufacturers for piston-engine development. It naturally presupposes that sponsoring Governments, engine manufacturers and oil companies will need to be rather more selective in their approach to these problems, and certain engines utilizing certain material combinations will need certain oils and not anything that satisfies a specification about as all-embracing as an angler's gesture.

Using Well-tried Components

With regard to the engine, the views expressed are based on the assumption that, in spite of nationalization and other democratic experiments, the utilization of our labour resources has to be economic, and only a small proportion should, therefore, be allowed to concentrate on piston-engine development. This immediately cuts out any radical experimentation with new shapes. We know radial air-cooled engines and in-line liquid cooled engines, and the developments undertaken during the war have allowed us to double the horse-powers of our engines without increasing their cubic capacity. The Merlin and the Hercules are examples of this.

The natural corollary to this statement is that if we halve these engines, i.e., a 7-cylinder Hercules and a straight-6



In the air-cooled class the author suggests a Bristol Hercules could be "halved." The Centaurus, shown above, would be equally suitable for the purpose.

Merlin, we have practically achieved what we want. An extremely loose generalization, but it can't be far off the mark when, at any rate for the radial air-cooled type, a single-bank design reduces the weight and complexity of the plumbers' nightmare by more than half, and at the same time removes a considerable cloud from off the head of those engaged in directing the cooling air.

Concentration should, therefore, be directed to the refinement of existing components, not the development of new ones, and the extension of their range by increasing oil circulations and, by thus improving internal oil cooling, use external means to reduce to a minimum such things as prolonged piston development. Considerable weight reductions can also be made by paying more attention to detailed design and finish, methods which were completely untenable when easy production was a vital necessity.

Only slight improvements can be expected in supercharger designs, but a well-designed single-speed blower should suffice for the projected altitude range and, coupled with careful induction-pipe design, should reduce considerably the weight of this part of the engine required to produce the necessary horse-power. Development work on complicated blower systems and the compounding thereof should be discarded for piston-engine projects.

Further increases in efficiency and reliability should be gained by the adoption of direct cylinder fuel injection and low-tension ignition systems. Both these lines of research were slowed-up by the war, which made it necessary for us to utilize existing methods promising more immediate results, but the time has now come when no new piston engine should be considered without them.

The experience we have gained in air cooling, cowling and the better disposal and manufacture of radiators should allow overall power plant gains to be obtained.

Perhaps the above remarks have outlined sufficiently the lines on which it is considered these limited resources of ours should be directed. And if the weight/power ratio quoted of 0.7 lb/h.p. could be achieved, and it ought to be, with a thermal efficiency probably double that of any turbine-airscrew combination we can at present visualize, we can use this vast piston-engine experience of ours to its best advantage and turn out an engine with an overall efficiency better than any other type with the minimum of labour and cost.

For engines smaller than the 1,000-1,500 h.p. class, the development emphasis need not be so strong—although there is room for considerable improvement—as the inherent advantages of the new forms of motive power are not so immediately practical in this sphere.

In conclusion, I feel that "Operation Requiem" should be put before the engine manufacturers in the form of a specification by the appropriate Ministry. This specification to be based, as pointed out, around the simplest shapes of aircraft piston engines we know, the single-bank radial and the in-line liquid-cooled, to fill the 1,000-1,500 h.p. size. The maximum stress should be laid on the utilization to the full of our existing knowledge to achieve the results, and a limit placed on the facilities for piston engine research except where the engine manufacturers' resources are not directly concerned.

Priority should be given to this project until our experience in the manufacture and operational reliability of the turbine and jet-propulsion engines in other spheres enable us to form a more detailed analysis.

RUSSIA'S AVIATION DAY

NEW Soviet aircraft, including jet and rocket types, were demonstrated publicly for the first time recently before Generalissimo Stalin and a huge crowd of spectators, including members of the Political Bureau of the Communist Party and military leaders, during "Aviation Day" celebrations in Moscow.

A special fly-past of new aircraft took place to show the fruits of the country's post-war aviation industry, writes Reuter's Moscow correspondent. One aircraft of each type zoomed singly past the reviewing stand, where the C.-in-C. of the Air Forces, Marshal Constantin Vershinin, explained various points to Generalissimo Stalin.

There were several new fighters and light bombers designed by Ilyushin and Tupolev, the Ilyushin XII, a transport, jet-propelled aircraft, and two rocket-planes, one of which has single rocket propulsion in the tail and the other two rocket engines, one on each wing. This was the first glimpse of Soviet jet and rocket planes, although the Russian Press has for some time announced designs in this field.

Foreign aviation experts attending said that as far as it was possible to judge in this brief view the machines were of conventional design.

A new four-engined bomber was also demonstrated, several flying over in formation, together with an experimental flying wing type of plane called "The Duck."

Older types, such as Yak fighters and Stormoviks, gave a programme of aerobatics and precision flying. Interception tactics were demonstrated when two German bombers with fighter escorts appeared, and in an ensuing mock combat they were promptly "shot down." An exhibition of parachute jumping ended with a mass jump from 12 transports.

Finally, a dirigible flew past bearing huge portraits of Lenin and Stalin, and that night salutes were fired from Moscow and Republic capitals in honour of Aviation Day.

SERVICE AVIATION

Royal Air Force and Naval Air Arm News and Announcements

R.A.F. Transport in Far East

R.A.F. Air Transport services in the Far East now come under the direct control of Headquarters Air Command South East Asia. Hitherto No. 232 R.A.F. Group, which was formed at Comilla in February, 1945, has been responsible for operating all R.A.F. Air Transport services east of Calcutta as far as Japan and south to the Netherlands East Indies, but it was disbanded on August 15th.

No. 232 Group has carried out excellent work and commitments have been many and varied. Among its responsibilities was the large scale evacuation of Allied prisoners of war and ex-internees in the Far East, and rice dropping to the starving peoples of Northern Burma.

No. 214 Group Reunion

AIR Chief Marshal Sir John Slessor and Lady Slessor will be guests of honour at the reunion dinner of H.Q. 214 Group, R.A.F. (now disbanded) which is to be held at the Holborn Restaurant, London, at 6.15 p.m. on Friday, October 4th.

Past members of this Group, which operated in North Africa and Italy from 1943 to 1945, who would like to attend the function should get into touch with ex-W/O. V. Whorwood, at 3, Boston Avenue, Reading, Berks, from whom full details and admission cards can be obtained.

R.A.F. Benevolent Fund

AS part of a nation-wide scheme to co-ordinate visiting and the investigation of cases needing assistance, and so ensure that all cases are covered without overlapping, honorary county representatives are to be appointed throughout the country by the R.A.F. Benevolent Fund. Some 45 representatives have already been appointed.

Air Marshal Sir Bertine Sutton will direct operations in the Southern Counties, Group Capt. the Earl of Selkirk will direct the Scottish representatives, and other area representatives are to be named for the Midlands and the North.

The 25th annual report disclosed that 25,591 cases of distress were helped by the Fund in 1945, and grants totalled £325,223, which was an increase of £162,610 over 1944. Education absorbed £13,227 of the total payments, and 547 children of deceased officers and airmen had their school fees paid in full.

"Flight" photograph.

STRAIGHT AND LEVEL: Adjustment of lateral trim on the Gloster Meteor is simplified by the provision of a lever with scale, access to the control being gained through a small panel in the wing surface marked "tab mass balance."

R.A.F. Anti-Malaria Operation

R.A.F. aircraft from Seletar airfield are to spray three widely dispersed mosquito breeding areas with D.D.T. These areas are at Batavia, Palembang and Mingaladon (Burma), and the complete operation is expected to take one month.

A medical officer will fly with the specially briefed crew of the aircraft to give expert advice in discharging the insect-killer over the breeding grounds. Areas selected for spraying cover R.A.F. Stations where labour is so short that men cannot be spared to carry out an adequate drainage and malarial control programme. Several Army camps will also be included in the operation.

The D.D.T. will be carried in two tanks each holding 325 gallons, and it will be released from the aircraft when flying at two hundred feet. The 650 gallons of D.D.T. stored in the aircraft on each trip is sufficient to spray an area of one square mile, and the operation takes about an hour to complete under normal weather conditions.

"Flight" photograph

POWER IN HAND: This experimental Vickers Warwick is in use as a flying test bed for Napier Sabre engines. Here seen with one airscrew feathered, the Warwick has a speed of over 300 kt with two Sabre VIs in place of the original Double Wasps. The latest annular radiator installation with cooling fan (described in *Flight*, of July 25th) is both neat and compact.

Brighter Diet in Japan

OFFICERS and men on stations of the British Commonwealth Air Force in Japan, commanded by Air Vice-Marshal C. A. Bouchier, C.B., C.B.E., D.F.C., R.A.F., can look forward to a brighter diet when plans for unit market gardens and the "airmen's fishing fleet" get under way.

Sqn. Ldr. B. Saunders, of Kalgoorlie, Western Australia, catering officer on the British Commonwealth Air Group at Iwakuni, is the man behind the plan and he has already organized a supply of 2,000lb of vegetable seeds to be flown from Australia for distribution to Air Force stations.

Fishing nets have also been ordered and when they arrive airmen will become part-time fishermen, manning the fleet of small boats to provide fresh fish for the messes. At each unit, men have been appointed to supervise the gardening which will be carried out by local Japanese labour.

Garden production at the British Commonwealth Air Group at Iwakuni will be under the expert care of ex-market gardener L.A/C. K. N. Dawson, of Morecambe, Lancashire.

"*Flight*" *photograph.*

OTTER TO THE RESCUE: Whenever the Meteors are flying, the speed record course is patrolled by A.S.R. (MK II) Sea Otters one of which is illustrated. This versatile amphibian, built to replace the Walrus, is powered by an 870 h.p. Bristol Mercury 30.

The Air Force as a Career?

MORE than 6,000 W/O.s, Senior N.C.O.s, and airmen at present serving in the Middle East are having an opportunity to air their views on an Air Force career.

A wing commander, as representative of the Director General of Manning, Air Ministry, is head of a team which arrived in Egypt last month, and has begun a tour of the whole Middle East Command. He is holding representative meetings during which he chats informally with any personnel who have "binds" or queries, or are interested in signing on again.

The wing commander has found that men in general were basing their ideas of the peace-time Air Force on present-day conditions.

"Married men in particular are unhappy at the continued separation," said the wing commander. "I feel that there is a great lack of knowledge on real peace-time conditions. It is impossible after years of war conditions to get back to a peace-time basis within 18 months. The lads should not jeopardize their whole career for the sake of the difficult transition period."

The Middle East team is one of seven which are making a world-wide tour to provide information on post-war conditions and to clarify problems raised by personnel who may stay in the Service.

Roll of Honour

Casualty Communiqué No. 599.

THE Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed. Casualties "in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Of the names in this list 146 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. P. D. Bainton; Flt. Lt. K. C. V. D Dundas, D.F.C; F/O J. D. Hassell; Flt. Sgt. H. J. F. Humphries; Act. Sqn. Ldr. K. Illingworth, D.F.C.; Sgt. A. E. Osguthorpe; Flt. Sgt. S. Siddle; W/O. M. C. Thomas; Flt. Sgt. W. G. Thomas.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. S. Abram; F/O M. W. Adamson; Act. Flt. Lt. C. H. Adcock; Sgt. E. A. Bailey; F/O. R. L. Barnet; Flt. Sgt. J. A. Beach; F/O. P. E. Bedell; Flt. Sgt. A. D. Blackburn; W/O. W. G. Blue; P/O. K. C. Briffett; Flt. Sgt. H. A. Brindle; A/C1 W. T. D. Burnett; Flt. Sgt. D. E. Butler; L.A/C. A. H. Chapman; Flt. Sgt. R. Cross; Flt. Sgt. G. A. Dinham; A/C.1 W. G. Duff; Sgt. P. Eaton; Sgt. R. W. Edge; W/O. J. C. Forbes; F/O. S. W. Foster; F/O. Q. Garden; W/O. A. D. D. Gee; Flt. Sgt. T. J. Gwynn; Sgt. L. Hall; Sgt. T. A. Hall; F/O. M. J. Horsey; F/O. D. J. Houston; Sgt. J. King; Flt. Sgt. R. A. Lewis; F/O. E. S. Lindsell; P/O. C. E. Lockwood; Sgt. R. Maddocks; Act. Sqn. Ldr. L. P. Massey, D.F.C.; Flt. Sgt. A. H. Maude; Sgt. S. C. Mintern; Sgt. J. A. Murray Flt. Sgt. H. R. Nice; Flt. Sgt. S. F. Pannell; F/O. F. J. Pickard; W/O. R. A. Powrie; W/O. L. F. Reynolds; Flt. Sgt. C. G. Rich; W/O. J. L. Ridsdale F/O. C. Robinson; P/O. L. A. Seary; W/O. A. Simpson; Sgt. H. I. Smithson; Sqn. Ldr. I. G. Statham, A.F.C.; F/O. J. C. Stevenson, D.F.C.; Flt. Sgt. W. C. Tassell; Sgt. K. Towers; F/O. J. A. Townsend; Sgt. J. E. Wadsworth F/O. K. F. Wandless; Flt. Sgt. L. E. Wardill; W/O. W. E. Webb; L.A/C. B. Weighell; Flt. Sgt. J. D. L. Williams; Flt. Sgt. L. E. Willis; Flt. Sgt. J. W. Wilmore.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Flt. Lt. J. G. Birks; W/O. K. Crabtree; Flt. Lt. J. M. Ireland; Flt. Lt. L. J. Lawrence, D.F.C.; W/O. S. Lyle; Sgt. L. A. Parker; Act. Sqn. Ldr. B. F. Perkins; W/O. R. A. Webb.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. A. Ashworth; L.A/C. S. M. Aungier; L.A/C J. K. Bond; W/O. C. T. Brain; W/O. F. Brindle; Sgt. N. C. Brunning; Flt. Lt. W. G. E. Buchanan; Flt. Sgt. E. Bulcock; Sgt. A. F. Butler; F/O. J. M. Butson; P/O. G. S. Button; Flt. Sgt. J. Caldwell; Flt. Lt. O. Chan; Flt. Sgt. E. A. Chapman; W/O. R. Clark; F/O. W. J. Cockerill; Sgt. B. B. Commer; L.A/C. C. G. Cottle; Sgt. L. T. Crabb; L.A/C. H. Cunningham; L.A/C. G. Daniels; Flt. Sgt. H. Edwards; Cpl. D. C. Elliott; Flt Sgt. D. W. Gillam; L.A/C. R. Gillingham; Flt. Lt. M. J. C. Gooch; Act. Group Capt. A. F. Hards, D.S.O.; F/O. J. Harris, D.F.C.; Flt. Sgt. W. S. Kinnair; Flt. Sgt. D. M. MacLean; Flt. Lt. J. L. Melia; Flt. Lt. D. D. Morrison; Flt. Sgt. E. Needham; F/O. D. F. Oliver; Flt. Sgt. J. R. Page; F/O. R. Robertson; Flt. Sgt. G. Robinson; F/O. T. A. Roskilly; W/O. E. F. Sadler; Act. Sqn. Ldr. J. Shepherd, D.F.C.; F/O. R. N. Smith; A/C.2 J. P. H. Stratton; W/O. J. W. Suart; Flt. Sgt. R. G. Tattingham Flt. Sgt. S. G. Wells; Flt. Sgt. S. A. Whiting; W/O. H. V. Whiting.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. W. Collingwood; A/C.1 R. Goacher; Flt. Sgt. W. C. Plummer.

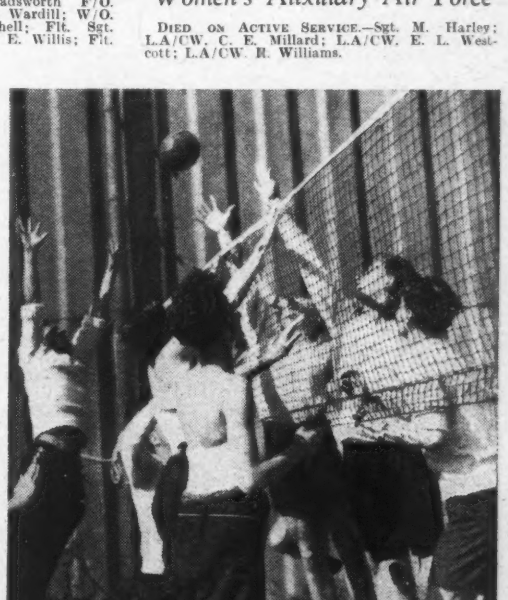
WOUNDED OR INJURED ON ACTIVE SERVICE.—F/O. R. L. Angless; F/O. A. F. Hopewell; W/O. R. C. Jones; A/C.2 C. M. A. Vallance.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—L.A/C. L. R. Fouracre; L.A/C. T. E. Giles L.A/C. H. Maude; F/O. P. H. Wattleworth.

DIED ON ACTIVE SERVICE.—L.A/C. K. J. Allen; A/C.2 H. Anderson; A/C.1 D. J. Aplin; A/C.1 F. Avis; Cpl. F. A. Aynsley; Flt. Sgt. F. G. Bailey; L.A/C. K. C. Barber; Cpl. R. A. Bean A/C.1 A. J. Beckett; L.A/C. E. R. Bell; Sgt. J. Blain; A/C.1 D. E. Blow; Flt. Lt. P. Bolter; L.A/C. C. J. Brandon A/C.1 L. D. Brown; L.A/C. W. H. Burnham; L.A/C. K. J. Bush; L.A/C. F. E. Cochrane; L.A/C. W. R. Collier; A/C.1 P. E. Darby; L.A/C. R. Davidson; L.A/C. A. E. Dixon; L.A/C. F. C. Dowding; L.A/C. H. A. C. Duff; W/O. C. R. East; Cpl. W. M. Edington; A/C.1 G. Edwards; L.A/C. T. Fairless; L.A/C. J. P. Farren; A/C.2 W. Fisher; A/C.2 M. Foan; L.A/C. E. A. Ford F/O. H. Frost, D.F.M.; L.A/C. J. Garraton; Flt. Sgt. A. Golightly; A/C.2 M. A. Gower; A/C.1 R. J. Greenshields; L.A/C. J. T. Gregory; L.A/C. J. R. Grundy; L.A/C. C. A. Gwilliams; L.A/C. E. S. Gymer F/O. G. A. Hall; Col. J. M. Hamilton; A/C.2 J. I. T. Hancock; Cpl. S. J. Haslam; L.A/C. W. J. Haylock; A/C.1 R. J. Holben; L.A/C. J. G. Hopps; A/C.1 F. E. Howard Sgt. J. M. Hughes; L.A/C. R. J. Inglis; L.A/C. B. Isherwood; Flt. Sgt. P. P. Jackson; L.A/C. J. E. Jones; Flt. Sgt. H. K. Kane; L.A/C. E. J. Lawrence; A/C.1 A. McKie; A/C.2 M. J. McKinney; A/C.2 H. M. Mansfield; A/C.2 R. L. W. Maple; L.A/C. K. T. P. Marlow; L.A/C. J. Martin; L.A/C. D. W. Martyn; A/C.1 V. D Matcham; Flt. Lt. S. C. Matthews, D.F.C.; Sgt W. Napier; L.A/C. A. Nichols; A/C.1 W. J Ormond; L.A/C. L. A. Page; L.A/C. A. R Parker; L.A/C. J. A. Parnham; W/O. B. T. Parsons; W/O. H. S. Pearce; A/C.2 A. E. Pearson; A/C.1 G. B. Peltor; Flt. Sgt. E. A. Percival; Cpl. C. R. Perkins; A/C.1 J. Pickles; L.A/C. S Pickles; L.A/C. W. J. Rees; A/C.1 R. G Richards; Cpl. L. G. Routley; W/O. L. G. Rowe; Sgt. C. G. Sharley; L.A/C. C. Simpson; Cpl. E. N. Singleton; L.A/C. J. Slack; W/O. H. F. J. Stone; Sgt. R. W. Studman; A/C.2 C. J. Sullivan; Cpl. E. Taylor; A/C.1 E. W. Taylor; L.A/C. A. Tombs; Flt. Sgt. S. A. Tomlinson; Flt. Sgt. S. J. Upsall; F/O. J. W. Vinall; L.A/C. J. E Ward; A/C.2 D. Warren; L.A/C. A. W. West; L.A/C. L. White; A/C.1 R. M. Whitehead; Flt. Sgt. J. F. C. Whittle; A/C.1 F. Wilson; L.A/C. N. Wilson; L.A/C. J. Withew; L.A/C. K. Wright; A/C.2 G. N. Yates.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—Sgt. M. Harley; L.A/CW. C. E. Millard; L.A/CW. E. L. Westcott; L.A/CW. R. Williams.



THE WAY BACK: R.A.F. men recovering from crash injuries under treatment at No. 2 Medical Rehabilitation Unit at Collaton, Devon. In this "spines v. legs" volley ball match, the two players in plaster have broken backs!

SERVICE AVIATION

Royal Australian Air Force

KILLED ON ACTIVE SERVICE.—Act. Sqn. Ldr. D. M. Davidson, D.F.C.

DIED ON ACTIVE SERVICE.—L.A/C. J. W. Murray.

Royal Canadian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. J. W. Anderson; F/O. F. V. Brennan; Flt. Lt. C. M. Brodie; Sgt. A. P. Campbell; F/O. R. R. Chappise; Flt. Lt. K. D. Cox; Sgt. J. C. B. Ekeberg; Sgt. J. A. Farr; Sgt. R. B. Halford; Flt. Lt. A. H. Harris; W/O. H. O. Irvine; Flt. Sgt. B. J. Johnston; F/O. L. W. Koehl; W/O. R. J. Krampp; F/O. I. Lindzon; Sgt. J. S. McIver; F/O. J. MacLeod; Flt. Lt. P. A. McMaster; Flt. Lt. W. G. McRae; P/O. J. A. Milne; F/O. W. E. Mittay; Sgt. M. Mostowy; Sgt. G. W. A. O'Connor; F/O. H. Parker; F/O. W. A. Payne; F/O. J. W. Piercy; F/O. E. W. Pollard; F/O. J. M. Potts; F/O. J. L. Reid; Sgt. W. L. Thornton-White; P/O. W. L. Washbrook.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. C. O. Barlow; Flt. Lt. T. Bell; P/O. G. R. Bullion; F/O. T. G. Burton; F/O. D. M. Cameron; F/O. R. M. Clarke; P/O. W. D. Coulson; W/O. S. J. Cox; F/O. R. J. Crossfield; F/O. W. G. Cunningham; P/O. C. K. Douglass; P/O. M. W. W. Duley; P/O. S. M. Duncan; F/O. W. A. Eden; Flt. Lt. E. E. Ettinger; F/O. R. G. H. Fisher; W/O. J. E. Fitzpatrick; P/O. G. F. Greenlee; Flt. Sgt. D. L. Haberthur, F/O. D. R. Hardy; Flt. Sgt. G. W. Hill; Flt. Sgt. J. C. Hodichak; P/O. R. H. Holtan; Flt. Sgt. P. N. Humeniski; F/O. J. B. Johnson; L.A/C. C. J. Kopp; Sgt. R. H. Lacey; P/O. D. A. MacLaren; F/O. R. H. McLeod; P/O. P. J. Maika; Flt. Lt. W. A. Manylnk; Flt. Sgt. J. W. Paterson; F/O. T. C. Reeve; F/O. F. R. Ross; W/O. G. L. Rowe; F/O. W. Russell; F/O. W. F. Stafford; F/O. J. M. Taylor; Flt. Lt. W. M. Tree; Flt. Sgt. S. J. Veres.

KILLED ON ACTIVE SERVICE.—L.A/C. W. S. Pink.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Lt. R. B. Ashley; P/O. F. A. Marshall.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Flt. Lt. J. Mackay.

DIED ON ACTIVE SERVICE.—W/O. H. P. Low; F/O. E. Martin; W/O. R. C. Smith; L.A/C. L. G. Stiff.

Royal New Zealand Air Force

KILLED ON ACTIVE SERVICE.—Flt. Lt. L. Miller.

DIED ON ACTIVE SERVICE.—F/O. B. A. T. Soundy.

South African Air Force

DIED ON ACTIVE SERVICE.—A/Mech. J. Erasmus; W/O. B. J. Oosthuizen; Cpl. J. Stevens; W/O. G. F. Tarr; A/Mech. A. M. Warner.

Royal Indian Air Force

KILLED ON ACTIVE SERVICE.—W/O. D. A. Shah.

Casualty Communique No. 600

Of the names in this list 185 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. P. Bourke.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. F. C. Banks; F/O. E. M. Berry; Flt. Sgt. J. S. Britter; Flt. Sgt. E. G. Cade; Sgt. W. Drake; Sgt. J. Heywood; Flt. Sgt. D. D. Lowcock; W/O. G. F. McMillan; Flt. Sgt. R. G. Muggleton; Flt. Sgt. K. F. Paine; Flt. Sgt. W. H. Whitehall; Flt. Sgt. H. O. Williams; Flt. Sgt. P. N. Woolley.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. J. Adams; Flt. Sgt. P. J. Adamson; W/O. J. S. Aitken; Flt. Sgt. E. E. Ambler; Sgt. G. E. Anderson; Sgt. E. W. Austin; Sgt. A. C. Ayres; Sgt. L. Bambridge; Sgt. E. Bates; Flt. Sgt. D. F. B. Bell; Sgt. J. C. A. Bell; Act. Flt. Lt. P. H. G. Blight; W/O. E. M. Boon; F/O. R. K. Bourne; F/O. D. P. Bowie; Flt. Sgt. J. W. C. Bowie; Sgt. D. E. Briggs; Flt. Lt. A. Brown; Sgt. C. Brown; Act. Flt. Lt. E. Brown; F/O. G. H. E. Buckley; F/O. W. A. Calder; Flt. Sgt. A. V. C. Campbell; Flt. Sgt. C. G. Campbell; F/O. J. W. Campbell; Flt. Sgt. A. M. Carew-Gibbs; Sgt. R. A. Chambers; Sgt. R. H. Chester; Sgt. F. M. Christmas; Sgt. G. W. Clement; Flt. Sgt. G. R. A. Clements; W/O. W. T. Cochrane; Flt. Sgt. L. J. Coles; Flt. Lt. D. M. Colmore; Flt. Sgt. H. R. Crust; Flt. Lt. A. W. B. Davies; Flt. Sgt. D. P. Doak; Flt. Sgt. J. B. Dodds; F/O. A. W. Donald; F/O. L. C. Edwards, D.F.M.; Sgt. A. V. Evans; F/O. R. C. Finn, D.F.M.; Flt. Lt. J. Gillies, D.F.M.; Flt. Sgt. W. G. Goodwin; F/O. L. K. Gordon-White; Sgt E. Graham; L.A/C. E. J. Graves; Flt. Sgt. R. F. Greetham; W/O. W. Griffiths; Flt. Sgt. E. R. Groucott; Flt. Sgt. C. C. Gurney; F/O. R. F. M. Hacker; F/O. G. W. Haigh; Flt. Lt. C. W. Harper, D.F.C.; Sgt. R. W. Harrison; P/O. K. F. Harvey; Flt. Sgt. K. Hawkins; Flt. Sgt. R. B. Henderson; Flt. Sgt. W. Higgins; Flt. Sgt. H. I. Highfield; Flt. Sgt. W. V. Hinds; Sgt. R. G. Hinton; Flt. Sgt. S. J. Holland; Flt. Sgt. J. H. Holt; Sgt. D. L. Housley; Flt. Lt. G. R. Humphries; L.A/C. A. G. John; Sgt. E. M. John; Sgt. T. J. Jones; Sgt. A. L. Joynson; P/O. A. B. Kearon; Sgt. P. N. Keeley; F/O. C. D. Kenwrick-Cox; Sgt. E. C. Kostromin; Sgt. K. E. Lamond; Flt. Lt. N. D. Lancaster; Flt Sgt. T. Leckey; F/O. J. L. W. Logan; Flt. Sgt. C. W. Lovell; P/O. W. C. Luff; Sgt. D. McAlhone; Sgt J. E. McColley; Flt. Sgt. H. B. McCreery; Sgt. C. R. McGregor; F/O. E. E. Mackay; Flt. Sgt. P. R. Mann; Flt. Sgt. W. W. Martin; Flt. Sgt. J. Mathewson; Sgt. R. Morgan; Flt. Sgt. C. J. Moss; Sgt. J. D. Moxham; Flt. Sgt. R. C. Nash, Sgt. G. P. O'Connor; Flt. Lt. B. G. L. O'Reilly; F/O. F. Pegg; P/O. D. A. Pitchers; W/O. J. W. Preston; Flt. Sgt. D. W. Riddle; Sgt. T. Robson; Sgt. G. Rysdale; Wing Cdr. C. G. Skinner; Flt. Sgt. W. D. Smail; Sgt. J. Spedding; Flt. Lt. H. W. Street; F/O. P. R. C. Sykes; Flt. Lt. R. Thomas, D.F.C.; Sgt. R. M. Thomas; Act. Flt. Lt. G. N. Thompson; Flt. Sgt. T. W. Thompson; F/O. A. J. Tiddy; F/O. J. W. Underhill; P/O. R. S. Vincent; Sgt. N. C. Watling; Flt. Sgt. R. Watson; Sgt. R. G. Wheeler; Flt. Sgt. H. I. Willcock; F/O. H. P. Willson; Sgt. R. Wilson; Sgt. A. T. Wood; F/O. J. Woodall; P/O. H. C. Young; Flt. Sgt. V. D. Perry.

MISSING.—Flt. Lt. W. R. Burman; F/O. P. J. Newton; F/O. C. Timms.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. R. M. Anderson; Sqn. Ldr. G. E. Ball; F/O. V. A. Bain; Flt. Sgt. H. Barker; Flt. Sgt. E. E. Bartlett; F/O. S. McI. Blackhall; F/O. M. F. Blumer; F/O. N. L. Brown; F/O. G. A. Cook; L.A/C. R. G. Dickens; P/O. K. Dellin; L.A/C. G. A. Doxey; W/O. J. E. Edwards; Flt. Lt. L. B. A. Elias; Wing Cdr. A. Eyre, D.F.C.; L.A/C. E. J. Fessi; Flt. Lt. F. S. Foss; Flt. Lt. V. F. Funnell; F/O. W. E. Garrod; Sgt. G. Granger; W/O. A. G. F. Gravestock; Flt. Lt. A. A. Harvey; F/O. C. W. Hogg; Flt. Lt. W. F. Ingles; F/O. F. W. Knowles; Flt. Lt. T. Knowles; Flt. Lt. M. A. Lacayo; Flt. Sgt. S. C. Low; F/O. D. A. Lowson; Flt. Lt. D. L. Oakenfold; Sgt. M. O'Donoghue; Sgt. H. O'Keefe; L.A/C. D. Palmer; Flt. Lt. V. Parker; L.A/C. W. C. Powell; W/O. W. D. Reeve; F/O. W. G. Reeve; F/O. J. B. Reid; Flt. Sgt. H. I. Sandison; Flt. Lt. A. W. A. Scott; Flt. Lt. H. R. Shephard; Flt. Sgt. T. E. Snook; F/O. J. Stephen; Flt. Sgt. R. C. Stevens; W/O. K. W. Stone; F/O. J. D. Taylor; A/C.2 J. W. Taylor; Flt. Sgt. D. Thomas; Sqn. Ldr. E. R. Thorn, D.F.C., D.F.M.; Flt. Lt. K. I. Thornton; Flt. Lt. S. M. Tugwell; Sgt. G. T. Wardle; Flt. Lt. A. E. Waters; Flt. Sgt. B. A. Watts; A/C.1 A. Whitford.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Flt. Lt. G. H. Cowles, D.F.C.; Flt. Lt. A. E. Lomas, D.F.C.

DIED ON ACTIVE SERVICE.—L.A/C. R. H. Archer; A/C.2 A. S. Bailey; Cpl. R. A. Bailey; Cpl. N. G. Ballard; A/C.2 H. W. Barth; L.A/C. F. H. Beaumont; A/C.1 A. F. Bedding; L.A/C. E. J. Beeston; L.A/C. F. J. Bradshaw; L.A/C. G. Brooker; L.A/C. C. C. Campbell; Flt. Lt. H. R. Coombe; Flt. Sgt. H. T. Cox; Cpl. C. Croser; A/C.2 W. Darby; Cpl. E. Dixon; W/O. D. E. Edwards; A/C.1 J. C. Evans; A/C.2 L. N. Fabb; L.A/C. J. S. Ford; W/O. J. S. Foster; L.A/C. L. S. Fountain; L.A/C. W. P. Giles; A/C.1 W. D. Gollop; L.A/C. S. C. Goodhand; Sgt. R. A. J. Goslin; L.A/C. A. Gregory; L.A/C. A. Grime; L.A/C. S. Gueran; L.A/C. F. G. Hall; A/C.2 L. Hall; L.A/C. F. Hamill; A/C.1 J. W. Hewitt; A/C.2 R. D. Hill; L.A/C. E. W. Hoe; Act. Flt. Lt. E. T. Holmes; Flt Lt. C. D. Holmes; L.A/C. A. S. Horne; A/C.2 A. J. Hughes; A/C.2 E. S. Humphrey; L.A/C. J. M. Isaacs; L.A/C. G. Jackson; A/C.2 J. Jamieson; A/C.1 J. E. Jones; A/C.1 T. Jones; A/C.2 V. L. Jones; A/C.2 M. E. Kirby; F/O. P. H. Leaver; Flt. Lt. J. N. Leslie; Sgt. J. Lister; L.A/C. J. Logue; A/C.1 H. J. Lyle; A/C.2 W. S. McConnell; A/C.1 H. V. Macey; A/C.2 S. Mares; L.A/C. H. Mason; Act. Cpl. W. Mayell; Sgt. A. Miller; L.A/C. J. B. Murdie; L.A/C. M. J. O'Boye; Flt. Lt. J. Percy; L.A/C. J. E. J. Phillips; Cpl. C. J. Porter; A/C.1 E. C. Quy; Act. Sqn. Ldr. E. A. F. Reeve; Flt. Lt. I. M. Rich; L.A/C. D. U. Robson; Act. Flt. Lt. B. C. Seagrief; L.A/C. D. Scott; L.A/C. J. Smart; F/O. R. Smerdon; A/C.2 E. M. Smith; Flt. Lt. H. Sunderland; Sgt. W. Taylor; F/O. K. S. Walker; Flt. Lt. J. H. L. Ward; L.A/C. J. A. White; L.A/C. B. J. G. Whiting; F/O. R. E. Wiltshire; Cpl. W. Winstanley; L.A/C. R. A. Windsor; Flt. Lt. D. J. Williams; L.A/C. W. J. J. Woodhouse.

PREVIOUSLY REPORTED MISSING, NOW REPORTED DIED ON ACTIVE SERVICE.—F/O. L. W. D. Clulee; F/O. F. Martin.

The badge of No. 52 Sqn., R.A.F.—"Sudore quam sanguine"—(By sweat and blood).

(Left) The badge of No. 463 Sqn., R.A.A.F.—"Press on Regardless," and (right) the badge of No. 81 Sqn., R.A.F.—"Non solum nobis"—(Not for us alone).

The badge of No. 20 Sqn., R.A.F.—"Facta non verba"—(Deeds not words).

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—L.A/CW. M. S. Bryant; L.A/CW. J. A. Buick; L.A/CW. M. Hare; L.A/CW. K. P. Townsend.

Royal Canadian Air Force

MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. W. J. Kyle; Sgt. C. P. McLaren; W/O. W. B. Rogers.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. H. E. Dougherty; F/O. W. Jackson; P/O. O. A. Keech; F/O. T. Kelley; W/O. D. G. McLeod; F/O. D. G. Sturrock; F/O. G. F. Trudgeon.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—W/O. C. Abildgaard; P/O. W. G. Adamson; P/O. P. Belkin; W/O. J. W. Y. Bibeau; W/O. J. Bicknell; P/O. A. L. Bonany; W/O J. J. J. F. Casaubon; F/O. V. E. Cross; P/O. R. N. Etherington; P/O. W. Gamo; F/O. J. D. C. Hooey; F/O. L. A. Illman; F/O. M. Jorgenson; W/O. J. Manning; P/O. M. P. Massey; P/O. K. A. Neville; F/O. C. R. Foster; Flt. Lt. G. W. Sellars; P/O. J. C. Siawson; Flt. Lt. R. S. Smith, D.F.C.; P/O. G. McC. Thickett.

KILLED ON ACTIVE SERVICE.—F/O. A. J. Clark; Sqn. Ldr. R. G. Joyce.

DIED ON ACTIVE SERVICE.—L.A/C. E. M. Hamill; Flt. Lt. G. R. Large.

PREVIOUSLY REPORTED MISSING, NOW REPORTED DIED ON ACTIVE SERVICE.—P/O. W. D. Hall.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. R. N. Chancellor; F/O. J. D. Rudling, D.F.M.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. A. V. Barr; F/O. W. Christiansen; Act. Flt. Lt. J. W. Coates; P/O. E. W. Cox; Sgt. A. M. Dingle; Flt. Sgt. F. S. Hunt; P/O. K. J. McAneny; Flt. Sgt. N. H. Maul; Sgt. J. B. Oliver; P/O. F. B. Pirani; Flt Sgt. N. E. Powell; Sgt. N. B. Rankin; Sgt. A. R. Reynolds; W/O. G. Sole.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Act. Sqn. Ldr. I. A. Sutherland, D.F.C.

South African Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Lt. L. J. Bensley.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW REPORTED KILLED IN ACTION.—Lt. H. M. Fisher.

DIED ON ACTIVE SERVICE.—2nd Lt. N. Anderson.

Royal Indian Air Force

KILLED ON ACTIVE SERVICE.—P/O. G. C. Walker.